

TORRINGTON MINERALS PTY LTD

ABN: 74 604 431 370

Torrington Tungsten and Topaz Project

Review of Environmental Factors

Prepared by:



R.W. CORKERY & CO. PTY. LIMITED

May 2016

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CONTENTS

	Page
LIST OF ACRONYMS.....	VI
1. INTRODUCTION AND SCOPE	1
2. THE SITE	3
3. THE EXISTING ENVIRONMENT.....	6
3.1 GENERAL DESCRIPTION	6
3.1.1 Climate and Weather	6
3.1.2 Topography	6
3.1.3 Soils and Land Capability	9
3.1.4 Existing Land Uses	9
3.1.5 Services	9
3.2 DESCRIPTION OF SENSITIVE LAND.....	10
3.3 DESCRIPTION OF SENSITIVE RECEPTORS	12
3.4 DESCRIPTION OF COAL SEAM GAS EXCLUSION ZONES	12
3.5 DESCRIPTION OF SURFACE AND GROUNDWATER RESOURCES	12
3.5.1 Surface Water Environment	12
3.5.2 Groundwater Environment	12
3.6 DESCRIPTION OF THREATENED SPECIES, POPULATIONS AND ECOLOGICAL COMMUNITIES	13
3.7 DESCRIPTION OF ABORIGINAL CULTURAL HERITAGE.....	16
3.8 DESCRIPTION OF HISTORIC CULTURAL OR NATURAL HERITAGE	16
4. THE PROPOSED ACTIVITY	17
4.1 SUMMARY OF THE ACTIVITY	17
4.2 DESCRIPTION OF THE ACTIVITY	17
4.2.1 Overview	17
4.2.2 Access.....	19
4.2.3 Drilling Operations.....	22
4.2.4 Decommissioning and Rehabilitation.....	24
4.3 STAKEHOLDER CONSULTATION.....	25
4.4 ACCESS ARRANGEMENTS.....	27
4.5 MITIGATION STRATEGY.....	27
4.5.1 Water Management Strategy	27
4.5.2 Produced Water Management Strategy.....	28
4.5.3 Hydraulic Fracturing (Well Stimulation).....	28
4.5.4 Waste and Chemical Management Strategy	28
4.5.5 Noise Management Strategy	30
4.5.6 Air Quality Management Strategy	30
4.5.7 Bushfire Management Strategy	31
4.6 JUSTIFICATION OF ACTIVITY AND ANALYSIS OF ALTERNATIVES	31
4.6.1 Justification of the Activity	31
4.6.2 Analysis of Alternatives	33
4.6.3 Consequences of Not Carrying Out the Activity	33



CONTENTS

	Page
5. IMPACT ASSESSMENT	34
5.1 ASSESSMENT OF PHYSICAL AND POLLUTION IMPACTS	34
5.1.1 Air Impacts	34
5.1.2 Water Impacts	34
5.1.3 Soil and Stability Impacts	35
5.1.4 Noise and Vibration Impacts	35
5.1.5 Other Physical or Pollution Impacts	35
5.2 ASSESSMENT OF BIOLOGICAL IMPACTS.....	36
5.3 ASSESSMENT OF RESOURCE USE IMPACTS.....	36
5.3.1 Community Resources	36
5.3.2 Natural Resources.....	37
5.4 ASSESSMENT OF COMMUNITY IMPACTS	37
5.4.1 Social Impacts	37
5.4.2 Economic Impacts	37
5.4.3 Heritage Impacts	37
5.4.4 Aesthetic Impacts	37
5.4.5 Cultural Impacts	38
5.4.6 Land Use Impacts	38
5.4.7 Transportation Impacts.....	38
5.5 IS THE PROPOSED ACTIVITY LIKELY TO IMPACT ON MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE UNDER THE COMMONWEALTH ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999?	39
5.6 ASSESSMENT OF CUMULATIVE IMPACTS	39
6. SUMMARY OF IMPACTS.....	40
7. CONCLUSIONS.....	47
8. STATEMENT OF COMMITMENTS	48
9. REFERENCES	51

APPENDICES

- Appendix 1 ESF4 – Exploration Activities Application Form
- Appendix 2 Ecological Assessment
- Appendix 3 Cultural Heritage Assessment

CONTENTS

	Page
FIGURES	
Figure 1	Locality Plan..... 2
Figure 2	Mineral Authorities, Regional Topography and Drainage..... 4
Figure 3	Land Titles, Land Ownership and Surrounding Residences 5
Figure 4	Seasonal Wind Roses – Tenterfield 3pm 7
Figure 5	REF Area Topography and Drainage 8
Figure 6	Vegetation Communities and Threatened Species 14
Figure 7	Proposed Activities 18
Figure 8	Schematic Drill Site Layout..... 23
TABLES	
Table 1	Key Requirements and Where Addressed 3
Table 2	Climate Averages..... 6
Table 3	Sensitive Land Within and Surrounding the Licence Area 10
Table 4	Listed Species with Potential to Occur 15
Table 5	Summary of the Proposed Activity..... 17
Table 6	Activity Impact Assessment Scoring for Consultation 26
Table 7	Indicative Drilling Chemicals 29
Table 8	Waste Management Strategy 29
Table 9	Summary of Potential Impacts 41
Table 10	Statement of Commitments 48
PLATES	
Plate 1	Open Area Not Requiring Mechanical Clearing..... 21
Plate 2	Open Area with Dense Fallen Timber..... 21
Plate 3	Regrowth Area Requiring Mechanical Clearing..... 21
Plate 4	Existing Access Track..... 21

LIST OF ACRONYMS

AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
CEC	Critically Endangered Ecological Community
DC	Diamond core drilling
DPI Water	Department of Primary Industries Water
DRE	Division of Resources and Energy
EEC	Endangered Ecological Community
EL	Exploration Licence
GDE	Groundwater Dependent Ecosystem
JORC	Joint Ore Reserves Committee
LGA	Local Government Area
RC	Reverse circulation percussion drilling
REF	Review of Environmental Factors

1. INTRODUCTION AND SCOPE

This Review of Environmental Factors (REF) has been prepared by R.W. Corkery & Co. Pty. Limited in conjunction with Torrington Minerals Pty Ltd (“the Company”) to assess the likely environmental impacts of proposed mineral exploration activities within a specific area (the REF Area) of Exploration Licences (ELs) 8258 and 8355 at Torrington, approximately 40km southwest of Tenterfield in northern NSW (**Figure 1**). Exploration is to be undertaken in support of the Torrington Tungsten and Topaz Project (“the Project”).

For the purpose of this document the following terminology is used.

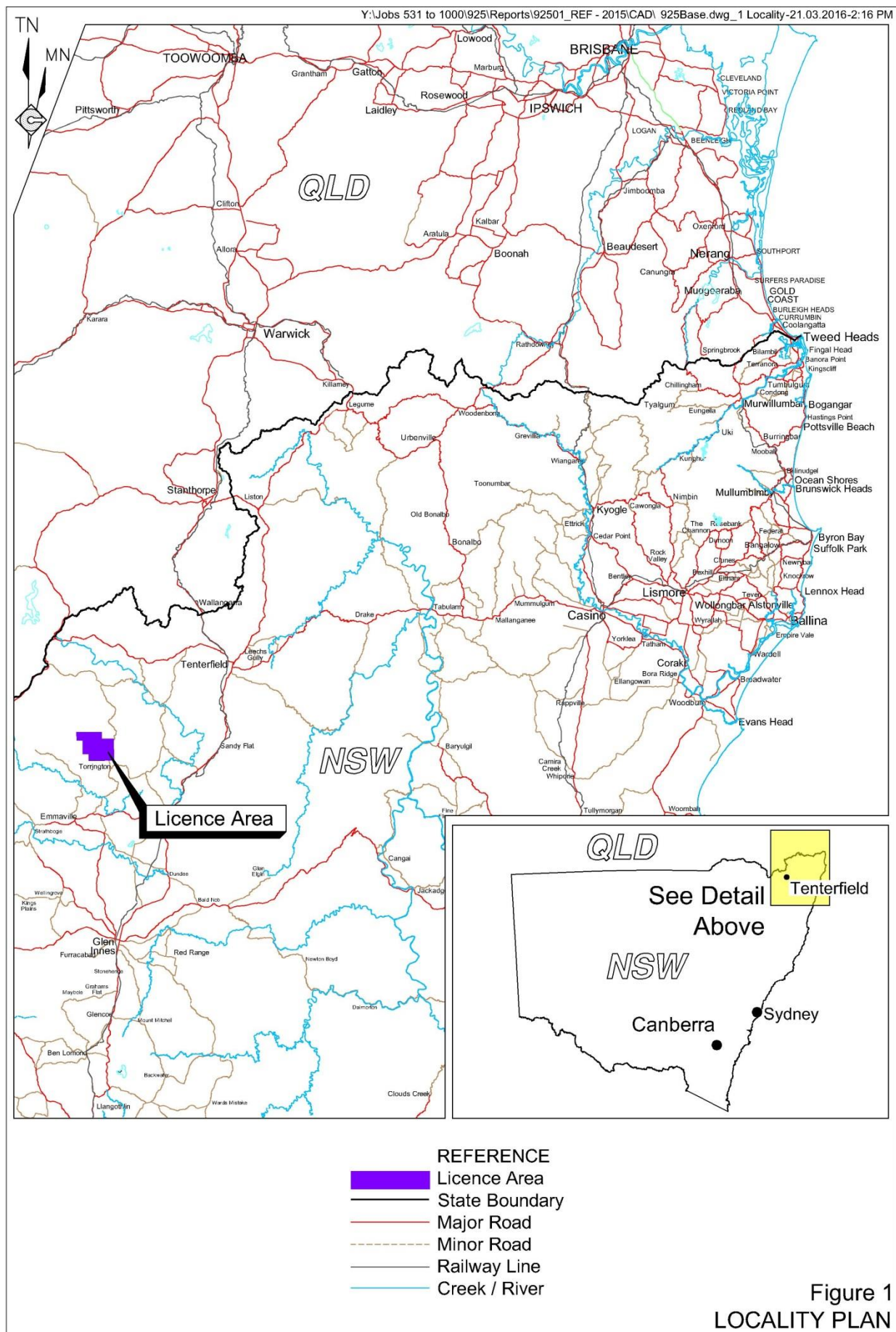
- Licence Area – the area covered by EL8258 and EL8355 (see **Figure 2**).
- REF Area – the area in which mineral exploration activities and sterilisation drilling would be undertaken under this REF (see **Figure 2**).
- Resource Identification Areas – the area in which targeted resource drilling is proposed to confirm, expand and upgrade the known resources. The Resource Identification Areas include the Mt Everard and Wild Kate / Burnt Hut Resource Identification Areas (see **Figure 7**).

The conditions of the exploration licences require all Category 2 or 3 activities to have further approval from the Division of Resources and Energy (DRE). The Company has identified the proposed exploration activity as including both Categories 2 (REF Area) and Category 3 (Resource Identification Areas) operations. As a result, an application for approval under the *Mining Act 1992* is required. That application is to be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and is to be supported by a REF.

This document has been prepared in satisfaction of that requirement in accordance with the document *ESG2: Guideline for Preparing a Review of Environmental Factors* published by Department of Industry, Skills and Regional Development in July 2015. The information in this document is provided in sufficient detail to allow the DRE to assess the proposed mineral exploration activities in accordance with Part 5 of EP&A Act. **Appendix 1** presents a copy of *ESF4 – Exploration Activities Application Form*.

No other approvals are required.

It is noted that the REF Area is partly located within the Torrington State Forest which is owned and managed by the Forestry Corporation of NSW. The Forestry Corporation of NSW has been consulted during the preparation of the REF to ensure all issues relevant to the Corporation are addressed. In addition, Ministerial Consent for exploration within the Torrington State Forest exempt area was granted on 26 April 2016.



2. THE SITE

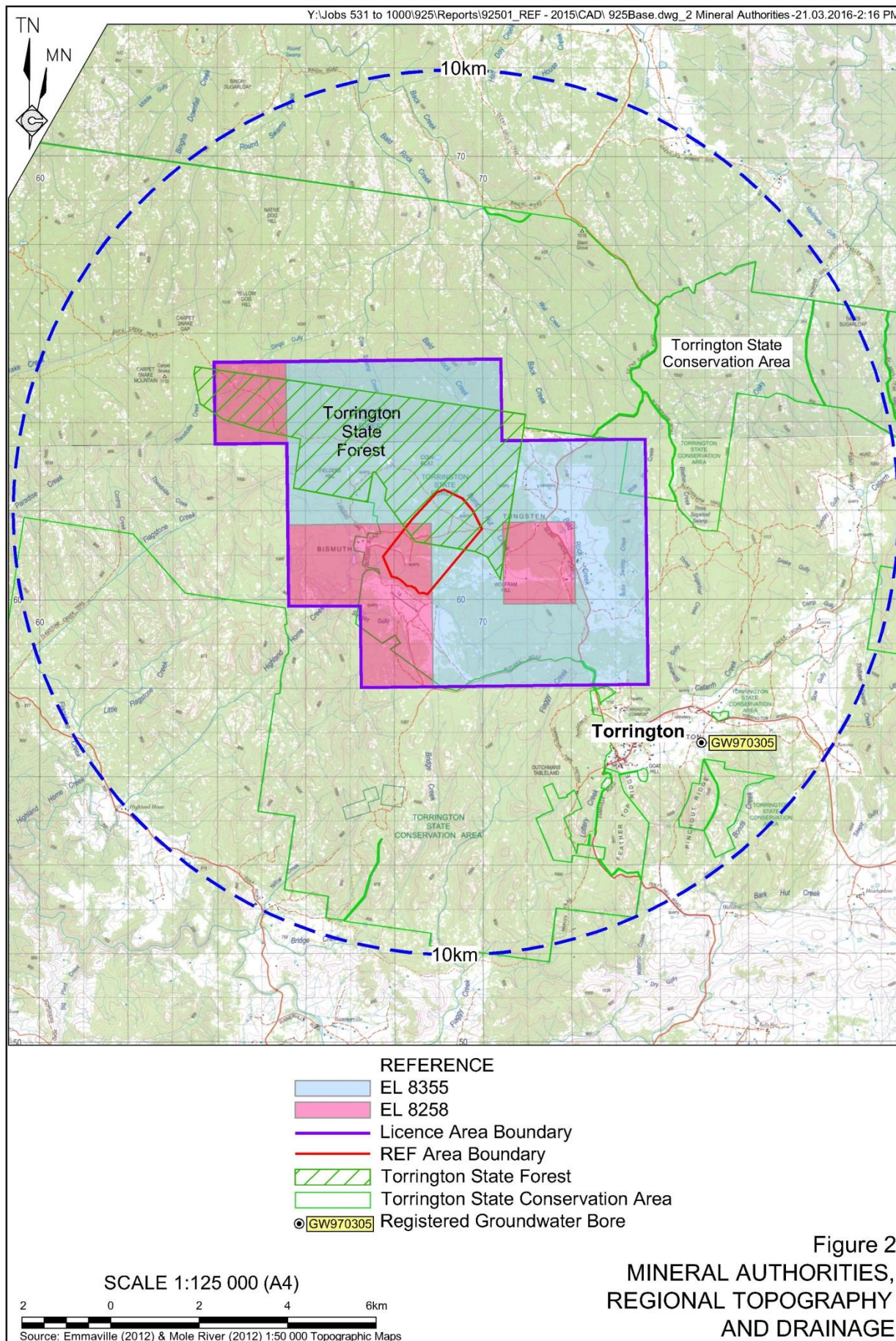
Figure 2 presents the Mineral Authorities held by the Company for the Project. **Figure 3** presents the land title information and ownership of land within the REF Area. As can be seen from **Figure 3**, the REF Area incorporates part of the Torrington State Forest and part of Lot 20 DP 753286 and covers a total area of approximately 290ha.

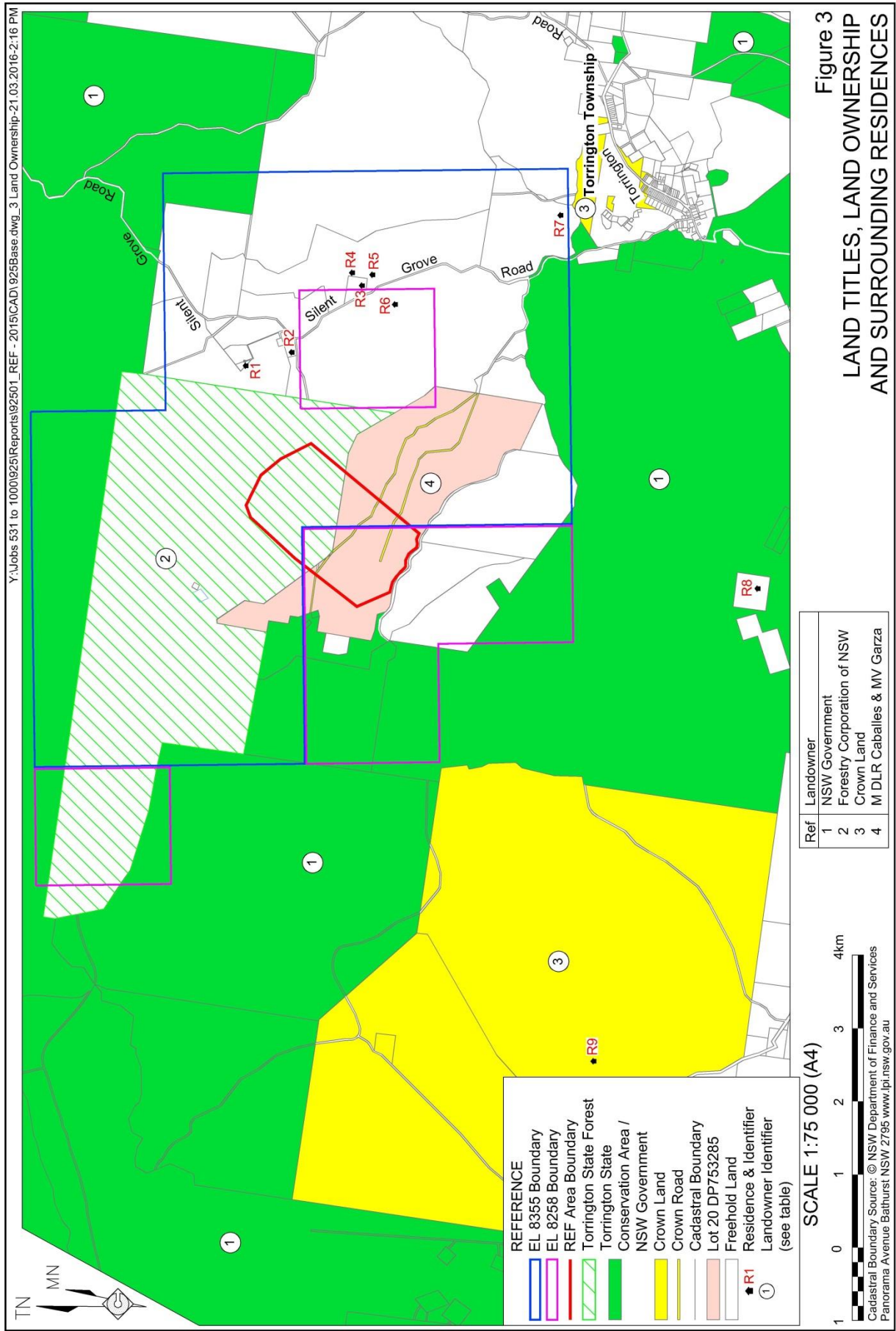
The locations of key activities are discussed in Section 3.2 and presented in **Figure 7**.

Table 1 presents where in this document other key information is presented.

Table 1
Key Requirements and Where Addressed

Requirement	Where Addressed
Boundaries of the title	Figure 2
Lot/Deposited Plan (DP) numbers and boundaries	Figure 3
Topographic contours	Figures 2 and 5
Location of the proposed activity	Figures 1, 2, 3 and 5
Layout of the proposed activity	Figure 7
Major regional features	Figures 1 and 2
Existing and proposed access tracks	Figure 7
Existing structures and infrastructure	Figure 7
Location of identified sensitive land	Figure 5
Nearby sensitive receptors (residences, schools, hospitals, etc.)	Figure 3
Coal seam gas exclusion zones	NA
Location of threatened species, populations or ecological communities, or their habitats	Figure 6
Location of Aboriginal and historic cultural heritage sites	NA





3. THE EXISTING ENVIRONMENT

3.1 GENERAL DESCRIPTION

3.1.1 Climate and Weather

Table 2 presents meteorological data obtained from the Bureau of Meteorology's Tenterfield (Federation Park) weather station No. 056032 located approximately 40km northeast of the Licence Area.

Table 2
Climate Averages

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (°C)													
Mean maximum temperature	27.1	26.1	24.6	21.7	18.0	15.0	14.4	16.0	19.5	22.4	24.8	26.6	-
Mean minimum temperature	14.4	14.3	12.5	8.5	4.9	2.4	1.0	1.8	4.6	8.0	10.8	13.0	-
Rainfall (mm)													
Mean rainfall	114.9	94.3	80.4	47.3	48.9	50.2	53.8	43.5	50.5	76.3	85.5	105.8	850.7
Mean number of rain days	10.5	10	9.8	7.2	7.4	7.7	7.4	6.5	6.4	8.1	8.7	9.9	99.6
Mean number of rain days >25mm	1.2	1.0	0.8	0.4	0.4	0.4	0.4	0.3	0.4	0.8	0.9	1.2	8.2
Source: Bureau of Meteorology - Tenterfield Station No. 056032 - accessed August 2015													

The general locality experiences mild to warm summers, with a mean maximum temperature of 27.1°C in January, and cool winters, with a mean minimum temperature of 1.0°C in July. Average rainfall is relatively high and totals 850.7mm with wetter summers and dryer winters. Whilst intense rainfalls do occur, on average, daily rainfall only exceeds 25mm for 8.2 days per year.

Figure 4 presents 3pm seasonal and annual wind roses from the Tenterfield (Federation Park) station. Wind direction varies throughout the year with winds predominantly from the northeast during summer and autumn and southwest during winter. During spring winds predominate from the northeast, southwest and northwest.

3.1.2 Topography

The regional topography surrounding the REF Area is presented in **Figure 2** whilst **Figure 5** presents the topography and drainage within the REF Area.

The REF Area lies within the northern section of the New England Tableland Bioregion which is characterised by a stepped plateau of hills and plains with elevations between 600m AHD and 1,500m AHD. Surrounding the REF Area, elevations range between 1,014m AHD at Goat Hill adjacent the Torrington Township and 700m AHD within the creeks north of the REF Area. Drainage generally occurs towards the north.

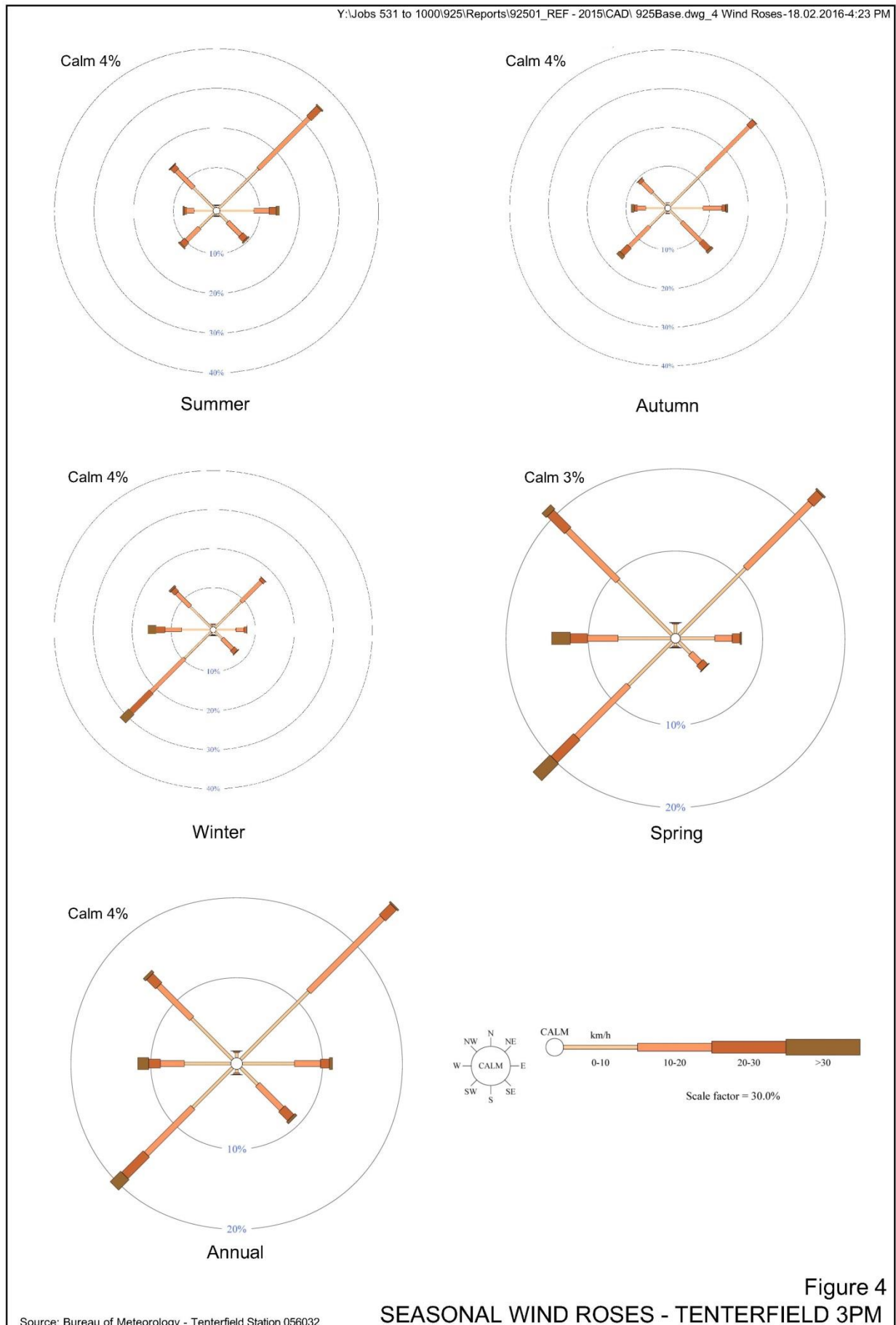
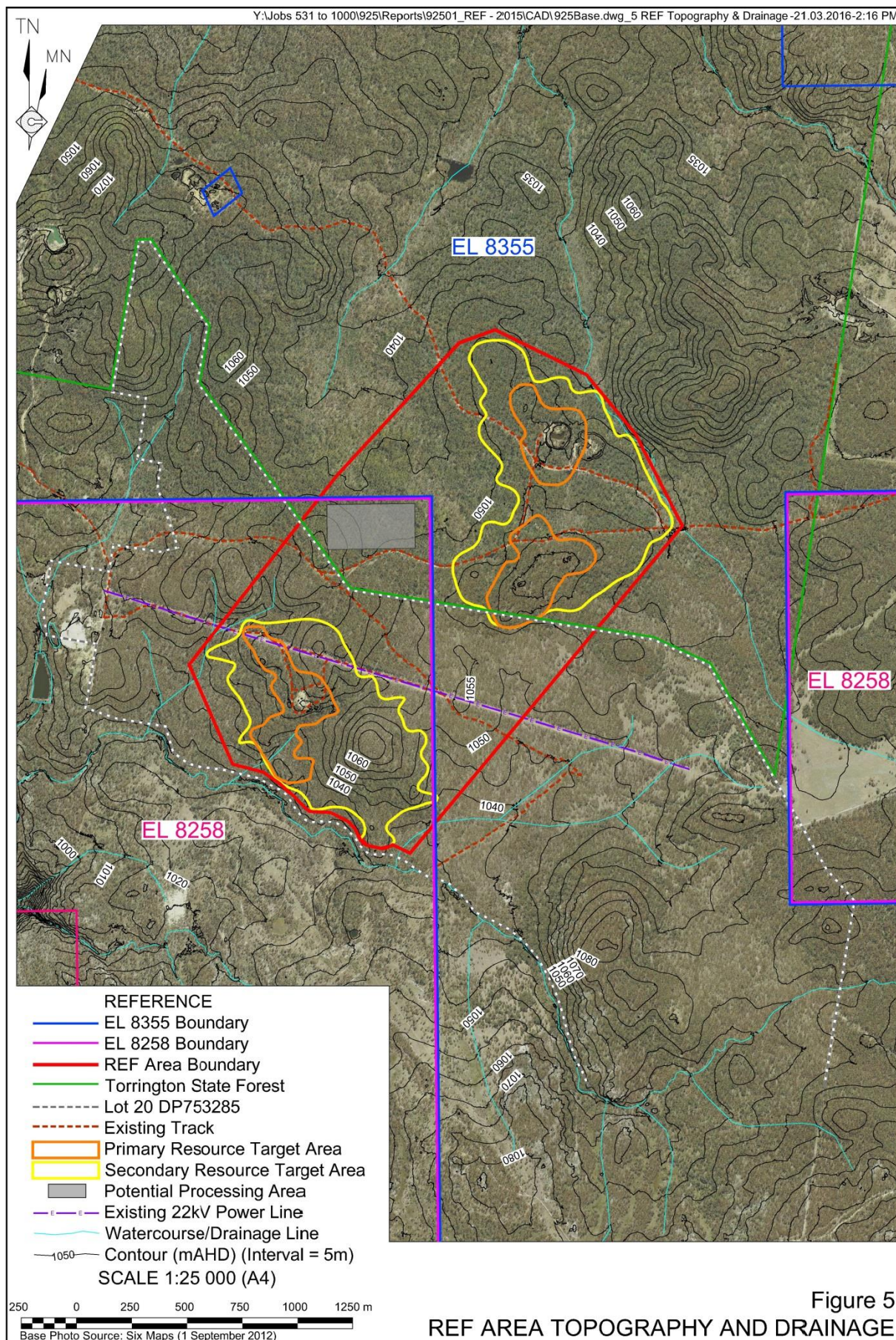


Figure 4
SEASONAL WIND ROSES - TENTERFIELD 3PM



The central section of the REF Area consists of relatively flat land generally sloping between 1° and 2° towards the north with elevations ranging from approximately 1,055m AHD near the southern boundary to 1,015m AHD at the northern boundary. A series of knolls are present near the southern boundary with elevations up to 1,069m AHD and slopes of approximately 8°. A more defined ridge is also present near the northeast boundary with an elevation up to 1,099m AHD and slopes of up to approximately 9°.

3.1.3 Soils and Land Capability

No soil landscape mapping is available for the REF Area or surrounds. Broad scale mapping compiled as part of the Australian Soil Classification (Isbell, 1995) records the REF Area as containing Sodosols. Sodosols are soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2m of the B2 horizon is sodic and not strongly acid.

General field inspections indicate soils are thin and derived from weathered granite and metasediments.

Given the shallow soils, current land uses, including forestry, without substantial agricultural activities, the soils within the REF Area have a land capability of Class 7 – Very Low Capability Land which is generally incapable of agricultural land use.

3.1.4 Existing Land Uses

The REF Area is located partly within the Torrington State Forest and partly within privately owned freehold land (Lot 20) utilised as a 'lifestyle block'. Lot 20 does not include a residence or any other improvements. The Torrington State Forest and surrounds have a history of mining and prospecting since the 1890's as well as logging, fossicking and recreational use.

Land uses surrounding the REF Area include nature conservation, nature based recreation, camping, horse riding tours and fossicking within the Torrington State Conservation Area (NPWS, 2003) to the north, south and west. Rural activities also occur further to the southwest and east, principally 'bush blocks' and limited agriculture, mostly grazing. The village of Torrington with a population of approximately 65 is located approximately 5km south-east of the REF Area. Six rural residences are located to the east of the REF Area, with the closest residence approximately 1.2km from the REF Area boundary.

3.1.5 Services

Infrastructure services available surrounding the REF Area include the following.

- Telecommunications – via a combination of wireless, copper cable and satellite.
- Power – a 22kV powerline running approximately east-west through the southern section of the REF Area (see **Figure 5**). This line once supplied power to the Pacific Copper processing plant approximately 500m west of the REF Area in the late 1970s and early 1980s. It is envisaged that this line would also be used by the Company for future operations. The Company has received written confirmation

that this line has been de-energized within the REF area and has lodged the necessary application to traverse and access the powerline area as necessary during its exploration activities. Management measures will be implemented to ensure safe operation of any machinery in the vicinity of the powerline.

Surrounding landholdings are typically self-reliant in relation to potable and non-potable water and management of waste water. Human services such as medical and government services are available in surrounding towns, including Tenterfield and Glenn Innes.

A 'Dial Before You Dig' search was also completed for the REF Area which indicates no telecommunication or underground power infrastructure is present.

3.2 DESCRIPTION OF SENSITIVE LAND

Table 3 presents an overview of sensitive land within or surrounding the REF Area.

Table 3
Sensitive Land Within and Surrounding the Licence Area

Page 1 of 2

Sensitive Land	Present within or surrounding the Licence Area
Conservation Areas	
Land reserved under the <i>National Parks and Wildlife Act 1974</i> .	None present
Land acquired by the Minister for the Environment under the <i>National Parks and Wildlife Act 1974</i> .	None present
Land subject to a 'conservation agreement' under the <i>National Parks and Wildlife Act 1974</i> .	None present
Land declared as an aquatic reserve under the <i>Marine Estate Management Act 2014</i> .	None present
Land declared as a marine park under the <i>Marine Estate Management Act 2014</i> .	None present
Land within a State Forest set aside under the <i>Forestry Act 2012</i> for conservation values including: <ul style="list-style-type: none"> • Flora Reserves, or • Special Management (and other) Zones. 	None present
Land reserved or dedicated under the <i>Crown Lands Act 1989</i> for the preservation of flora, fauna, geological formations or for other environmental protection purposes.	None present
Land identified as wilderness or declared a wilderness area under the <i>Wilderness Act 1987</i> .	None present
Land subject to a 'biobanking agreement' under the <i>Threatened Species Conservation Act 1995</i> .	None present
Drinking Water Catchment Protection Areas	
Land declared to be a controlled area' or a 'special area' under the <i>Water NSW Act 2014</i> or a 'special area' under the <i>Water Management Act 2000</i> or <i>Hunter Water Act 1991</i> .	None present

Table 3 (Cont'd)
Sensitive Land Within and Surrounding the Licence Area

Page 2 of 2

Sensitive Land	Present within or surrounding the Licence Area
Environmentally Sensitive Areas	
Land identified as critical habitat under the <i>Threatened Species Conservation Act 1995</i> or Part 7A of the <i>Fisheries Management Act 1994</i> .	None present
Land designated as a wetland of international significance under the <i>Ramsar Convention on Wetlands</i> .	None present
Land to which <i>State Environmental Planning Policy No. 14 – Coastal Wetlands</i> applies.	None present
Land to which <i>State Environmental Planning Policy No. 26 – Littoral Rainforests</i> applies.	None present
Coastal Waters of the State as defined in the <i>Coastal Protection Act 1979</i> and the <i>Coastal Protection Regulations 2011</i> .	None present
Land identified in an environmental planning instrument as being of biodiversity significance or zoned for environmental conservation.	None present
Waterfront land as defined under the <i>Water Management Act 2000</i> .	Present ¹
Land with a slope greater than 18 degrees measured from the horizontal.	None present ²
Land with Potential for Soil and Water Contamination	
Potential Acid Sulphate Soils or Actual Acid Sulphate Soils.	None present
Aboriginal Heritage Protection Areas	
Land declared as an Aboriginal place under the <i>National Parks and Wildlife Act 1974</i> .	None present
Land identified in an environmental planning instrument as being of Aboriginal cultural significance.	None present
Historic or Natural Heritage Protection Areas	
Land identified on the World Heritage List, National Heritage List or Commonwealth Heritage List.	None present
Land, places, buildings or structures listed on the State Heritage Register.	None present
Land identified in an environmental planning instrument as being of heritage significance.	None present
Biophysical Strategic Agricultural Land and Critical Industry Clusters	
Land identified as biophysical strategic agricultural land under <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i> .	None present
Land identified as a Critical Industry Cluster Land under <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i> .	None present
Community Land	
Public land classified as community land under the <i>Local Government Act 1993</i> .	None present
<p>Note 1: Waterfront land within the REF Area includes the areas within 40m of the creeks defined on the Emmaville and Mole River 1:50,000 topographic maps - see Figures 2 and 5</p> <p>2: Very small, localised areas with slopes exceeding 18 degrees may be present, however, overall slopes are less than 18 degrees (see Section 3.1.2)</p>	

3.3 DESCRIPTION OF SENSITIVE RECEPTORS

The location of sensitive receptors surrounding the REF Area are shown in **Figure 3**. Sensitive receptors may include residences, schools, hospitals, churches, etc. In the present case, all sensitive receptors are residences. The area is generally sparsely populated with seven residences within 5km of the REF Area. The closest residential receptor is located approximately 1.4km east of the closest point of drilling. This residence is infrequently occupied and is used by the owner as accommodation on a 'bush retreat' block.

3.4 DESCRIPTION OF COAL SEAM GAS EXCLUSION ZONES

The proposed activities do not relate to coal seam gas exploration and no coal seam gas exploration exclusion zones exist within the Licence Area.

3.5 DESCRIPTION OF SURFACE AND GROUNDWATER RESOURCES

3.5.1 Surface Water Environment

The REF Area lies within the area of the *Water Sharing Plan for the NSW Border Rivers Unregulated and Alluvial Water Sources 2012*. The proposed exploration activities would not trigger the requirements of this water sharing plan. The REF Area is not located within a drinking water catchment.

Drainage within the REF Area includes ephemeral 1st and 2nd order creeks which form tributaries of Burnt Hut Creek and Highland Home Creek which flow in a generally northerly and westerly direction respectively (**Figure 5**). Discussions with local residents indicate that these tributaries only flow for short periods following rainfall. Company personnel have confirmed this interpretation during site inspections.

Pooled surface water is permanently present within some former mine workings and dams. Five water quality samples were collected in November 2015 from a selection of these workings and dams. The analyses all recorded near neutral pH (6.67 to 7.20) with very low conductivity (<80µS/cm) and total suspended solids (<13mg/L). Metal concentrations (11 metal suite) were also within the ANZECC 95th percentile protection levels for all samples. It is also noted that the sampled workings and dams do not discharge to surface water. As a result, it would be expected that deleterious elements, if present, would have become concentrated by ongoing evaporation. Given these results, it is expected that the water quality of runoff to surrounding drainage lines would be of a similar or better quality.

3.5.2 Groundwater Environment

The REF Area lies within the area of the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011*. More specifically, the REF Area is located within the outcropped New England Fold Belt MDB groundwater source. A search of the Groundwater Dependent Ecosystem (GDE) Atlas confirms that there are no registered GDEs located within 10km of the REF Area. The closest GDE is the Beardy River, which contains ecosystems dependent on the surface expression of groundwater. The closest point of the Beardy River is approximately 10km southwest of the REF Area.

The exploration activities would not trigger the requirements of this water sharing plan.

A search for registered groundwater bores also confirms that the closest registered bore (GW970305) is located approximately 6km to the southeast of the REF Area (**Figure 2**).

Historic drilling records within and surrounding the REF Area to depths of up to 30m below ground level have not recorded the presence of any groundwater.

3.6 DESCRIPTION OF THREATENED SPECIES, POPULATIONS AND ECOLOGICAL COMMUNITIES

Field surveys for ecology were undertaken within the REF Area by EnviroKey between 26 and 29 September 2015. A full copy of EnviroKey's survey report is provided as **Appendix 2** and a summary of the results provided as follows.

- Seventy three flora species were identified during the ecology survey using the Random Meander Method of Cropper (1993). Of the species identified, three were introduced. No threatened flora species were identified.
- Three biometric vegetation communities were identified, (see **Figure 6**), namely:
 - BR116: Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands;
 - BR213: Silvertop Stringybark – Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands; and
 - BR122 Broad-leaved Stringybark – Mountain Gum – Apple Box open forest of the New England Tablelands.

BR116: Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands corresponds with the endangered ecological community (EEC), White Box – Yellow Box – Blakely's Red Gum Woodland (Box Gum Woodland). This community is listed as endangered under the TSC Act and the EPBC Act.

The other vegetation communities are not identified as EECs.

- Seventy fauna species were identified using the following survey methods.
 - Diurnal bird surveys.
 - Scat and animal sign searches.
 - Echolocation call recording.
 - Motion activated infrared cameras.
 - Call playback.
 - Spotlighting.
 - Herpetofauna searches.

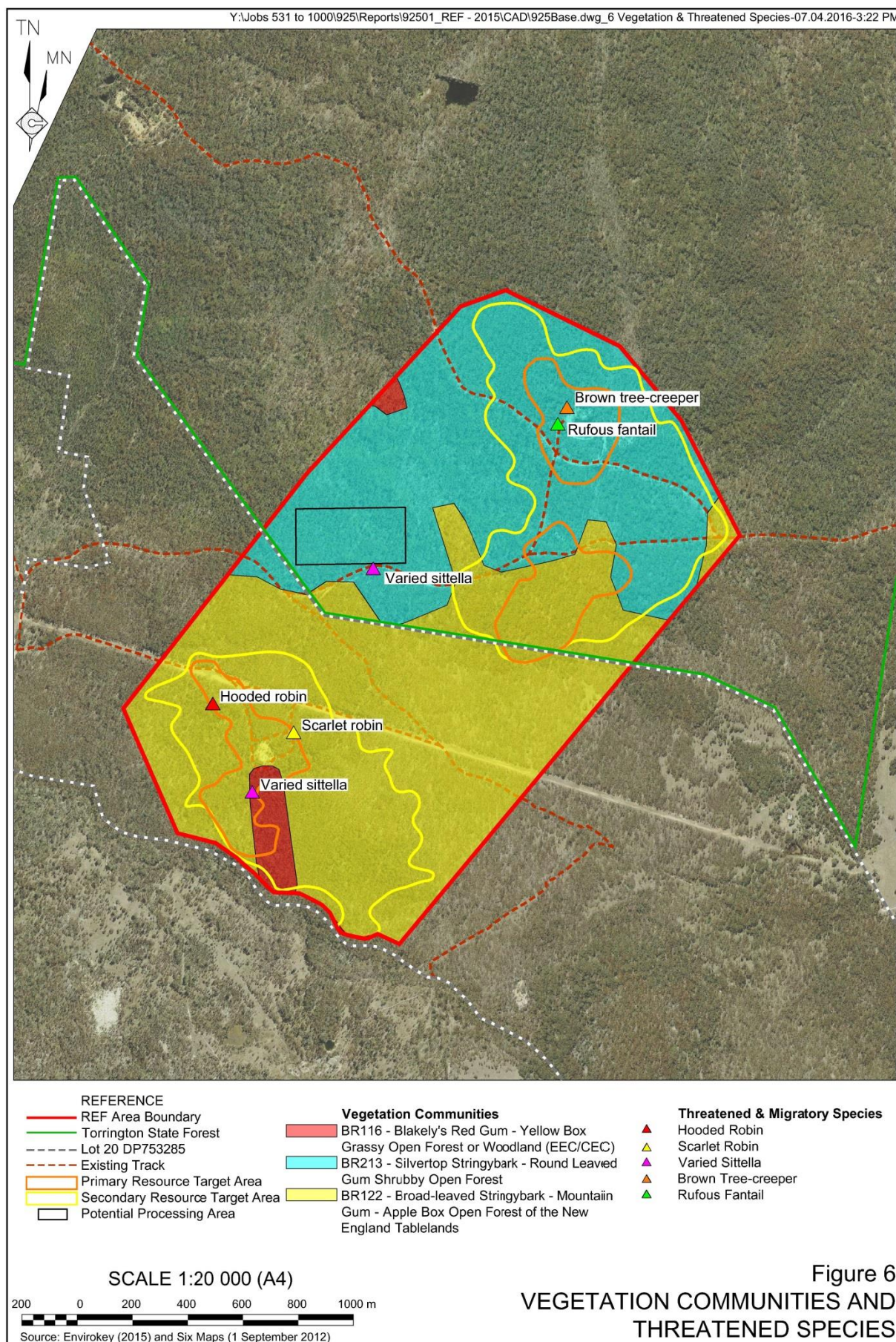


Figure 6
**VEGETATION COMMUNITIES AND
 THREATENED SPECIES**

- Of the 70 fauna species identified, five are listed as threatened species under the NSW *Threatened Species Conservation Act 1995* (TSC Act) namely:
 - Brown Treecreeper (eastern sub-species) (*Climacteris picumnus victoriae*) – Vulnerable;
 - Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*) – Vulnerable;
 - Scarlet Robin (*Petroica boodang*) – Vulnerable; and
 - Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable.
- Of the 70 fauna species identified, one migratory species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was detected, namely the Rufous Fantail (*Rhipidura rufifrons*).

Finally, based on a review of the results of the ecology survey and a review of previous monitoring, EnviroKey (2016) determined that the species identified in **Table 4** have the potential to occur within the REF Area.

Table 4
Listed Species with Potential to Occur

Species	TSC Act	EPBC Act	Species	TSC Act	EPBC Act
Black-chinned Honeyeater (eastern sub-species)	✓		White Box Yellow Box Blakely's Red Gum Woodland	✓	T
Barking Owl	✓		Beadle's Grevillia	✓	T
Brown Tree-creeper (eastern sub-species)	✓		Binghi Homoranthus	✓	T
Hooded Robin (South-eastern form)	✓		Crescent-leaved Homoranthus	✓	T
Powerful owl	✓		Granite Boronia	✓	T
Scarlet Robin	✓		Grove's Paperbark	✓	T
Varied Sittella	✓		Heath Wrinklewort	✓	T
Rainbow Bee-eater		M	MacNutt's Wattle	✓	T
Rufous Fantail		M	McKie's Stringybark	✓	T
Eastern Bentwing Bat	✓		Native Milkwort	✓	T
Eastern False Pipestrelle Bat	✓		Overden's Ironbark	✓	T
Greater Broad-nosed Bat	✓		Rusty Desert Phebalium	✓	T
Grey-headed Flying Fox	✓	T	Torrington Beard Heath	✓	T
Hoary Wattled Bat	✓		Scant Pomaderris	✓	
Koala	✓	T	Torrington Pea	✓	T
Squirrel Glider	✓				
Yellow-bellied Sheath-tail Bat	✓				
Note: T = Threatened; M = Migratory					
Source: EnviroKey (2016) – After Section 10					

3.7 DESCRIPTION OF ABORIGINAL CULTURAL HERITAGE

A due diligence assessment of the Project has been completed by McCardle Cultural Heritage Pty Ltd. A full copy of the assessment is provided as **Appendix 3**. As part of the assessment, a search of the Aboriginal Heritage Information Management System (AHIMS) Site Register was completed. A total of 17 known Aboriginal sites are recorded within a 10km radius of the REF Area. None of the registered sites are located within the REF Area.

A survey of the Resource Identification Areas and potential processing plant area was also completed on 18 February 2016. No archaeological sites or Potential Archaeological Deposits (PADs) were identified and the potential for artefacts to occur within these areas was assessed as being low or negligible.

A search of the Register of Native Title Claims on 18 January 2016 confirms the REF Area is currently not incorporated into any existing Native Title Claims. Additionally, the notification and right to negotiate process specified by the Commonwealth *Native Title Act 1993* was completed by the Department of Industry for the transfer of EL8258 and EL8355 to the Company, with the Department confirming on 11 March 2016 that “there were no claims for native title lodged regarding the above titles.”

3.8 DESCRIPTION OF HISTORIC CULTURAL OR NATURAL HERITAGE

A search of the Australian Heritage Database (which includes the World Heritage List, Commonwealth Heritage List and the National Heritage List), the NSW State Heritage Register and the *Tenterfield Local Environmental Plan 2013* was conducted on 17 January 2015.

The searches of the above mentioned databases for all heritage listed items within the Tenterfield LGA did not identify any sites of non-indigenous or natural heritage significance within or nearby the REF Area.

Whilst the local area has been disturbed by historic mining activities, the Company is unaware of any items of heritage significance within the REF Area. The closest known item of potential historic heritage significance is a historic Pacific Copper plant site (circa 1980s) located approximately 500m west of the southwestern boundary of the REF Area.

4. THE PROPOSED ACTIVITY

4.1 SUMMARY OF THE ACTIVITY

Table 5 presents a brief summary of the proposed activity.

Table 5
Summary of the Proposed Activity

Title numbers	EL 8258 and EL 8355
Title holder	Torrington Minerals Pty Ltd
Operator	Torrington Minerals Pty Ltd
Activity type	Reverse Circulation Drilling Diamond Drilling Ancillary activities
Activity location	Within the REF Area identified on Figure 7 .
Activity duration	3 to 4 months followed by evaluation of results and further possible follow-up

4.2 DESCRIPTION OF THE ACTIVITY

4.2.1 Overview

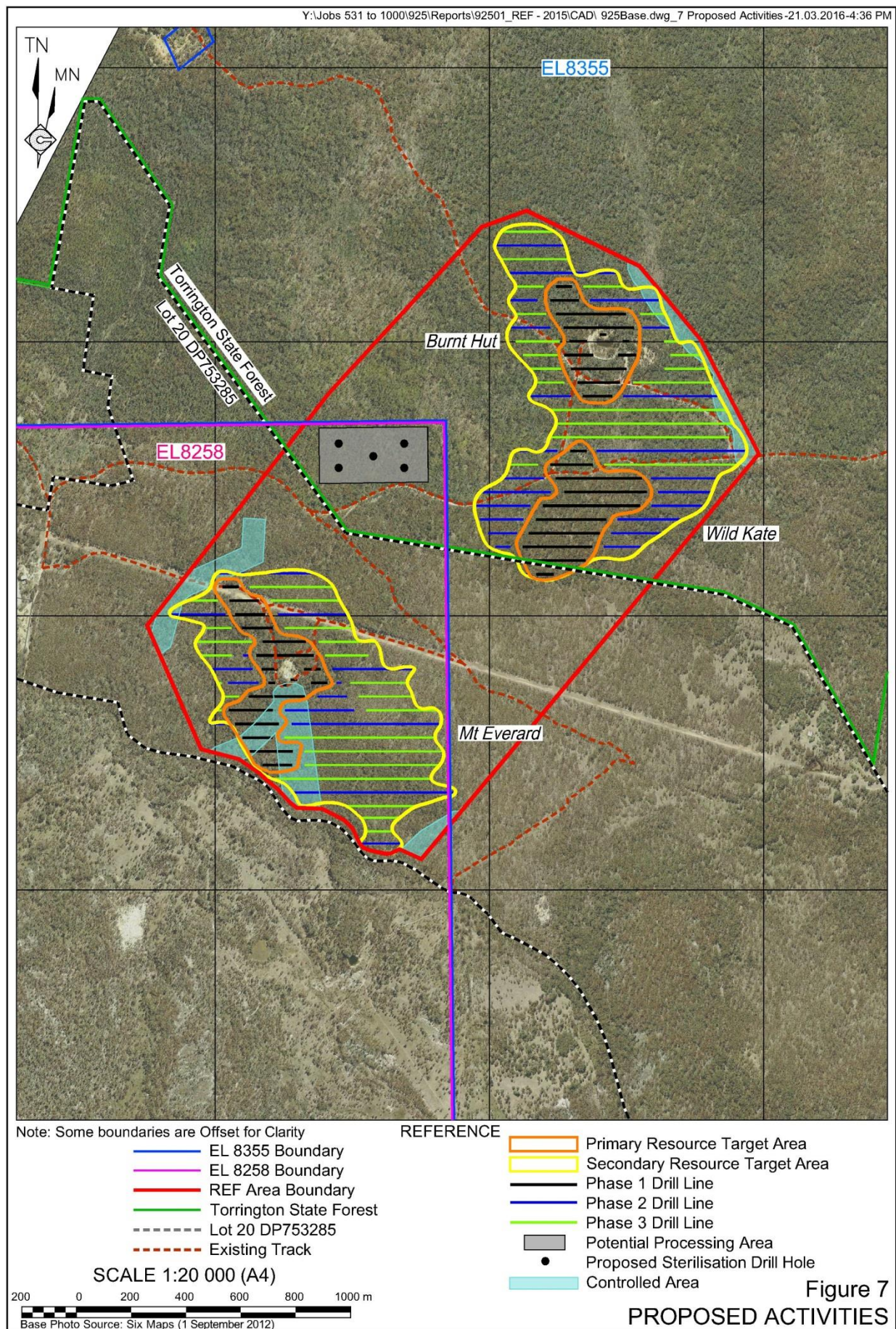
The objectives of the proposed activities are to:

- further develop the geological understanding of the Mt Everard and Wild Kate / Burnt Hut Identification Areas, with a view to preparing an updated JORC Code-compliant resource estimate statement;
- increase the existing 2012 JORC Code-compliant resource from ~5,000t to between 10,000t and 15,000t of WO₃ (tungsten oxide); and
- undertake sterilisation drilling of potential infrastructure areas, in particular the potential processing area.

To achieve this, the Company proposes to drill a total of up to 17,000m with up to 600 shallow drill holes, using a combination of reverse circulation percussion (RC) and diamond core drilling (DC) methods within the REF Area. Holes are typically expected to be up to 30m deep based on previous drilling, but could be up to 50m deep if the silixite continues below 30m. It is expected that in the order of 35% of the holes would be DC.

The drilling programme would be undertaken in three phases as follows and as shown in **Figure 7**. These phases would most likely be undertaken concurrently depending on the results of the ongoing exploration drilling.

- Phase 1: This phase would be undertaken within the primary resource target area. Holes would ideally be spaced 50m apart along transects with transects also spaced 50m apart (the spacing may be approximate pending trees and other obstacles). The proposed transects would be approximately 5.6km in total length.



- Phase 2: This phase would build upon results of the Phase 1 drilling program. This Phase would involve extending the initial transect lines and/or construction of additional transect lines in areas adjacent to the initial transect lines to expand resources. If all the holes are completed, a total of approximately 8.1km of additional transect lines may be constructed. Holes along the transect lines constructed during this phase would be spaced approximately 50m or 100m apart, with the additional transect lines spaced up to approximately 200m apart.
- Phase 3: This phase would build upon the Phase 2 drilling programme and would provide for further infilling and extension of transect lines and inclusion of additional transect lines. If all the holes are completed, a total of approximately 9.8km of additional transect lines would be constructed. Holes along the transect lines would similarly be spaced approximately 50m or 100m apart, with transect lines spaced approximately 50m apart. Pending JORC Code resource estimate requirements there may also be some 25m spaced (mostly DC) holes drilled on previously constructed transect lines.

The total length of additional transect lines and total number of holes during the Phase 2 and Phase 3 drilling programs would be subject to the results of the previous phases of drilling. However, the total length of transect lines during all three drilling phases, assuming that all holes are completed, would be 23.5km, with all transects being approximately 2.5m wide. However, a proportion of the proposed transect lines would not result in ground disturbance or disturbance of vegetation (see Section 4.2.2).

During each Phase, the location of transects and drill holes would be adjusted in order to avoid environmental constraints such as large trees and physical obstacles.

Finally, five sterilisation holes would be drilled within the Potential Processing Plant Area during the REF period (as shown on **Figure 7**).

In addition to the proposed drilling operations, sampling of material from historic mining operations may also be undertaken utilising hand sampling techniques. This sampling would be undertaken in pre-existing disturbance areas and accessed using existing tracks. As no additional environmental impacts associated with this activity are proposed, it has not been assessed further in the document

The Company anticipates that the proposed activities would commence in the third quarter of 2016, pending receipt of all required approvals. The period of time required to complete the programme would be approximately 3 to 4 months, with the completion date dependant on drilling results, weather and equipment availability.

4.2.2 Access

Wherever possible, access to the drilling areas would be via existing unsealed tracks (**Figure 7**). Additional vehicular access would be along the proposed transect lines. Transect lines would be established in areas that may be classified as follows.

Class 1 – Open areas requiring no mechanical clearing (Plate 1)

No ground-disturbing activities would be required in Class 1 areas. Some trimming of branches or moving of fallen timber by hand may be required. Small shrubs would be driven over if required, preserving the root stock to facilitate later regrowth. As far as practicable, no standing trees with a diameter at breast height (indicatively at 1.3m above ground level) of greater than 20cm would be removed.

Class 2 – Open areas requiring mechanical movement of fallen timber (Plate 2)

No ground-disturbing activities would be required in Class 2 areas. However, due to previous disturbance and fires, some areas contain substantially sized fallen timber. Access within these areas would be achieved via a combination of manual cutting of the timber using a chainsaw and pushing using a suitable bulldozer equipped with a “stick rake” or blade with a width of approximately 2.5m. Use of a stick rake or blade with short teeth along the lower edge would permit removal of fallen vegetation with minimal disturbance of the soil. Fallen timber would be pushed to the side to facilitate vehicular access. As far as practicable, no standing trees with a diameter at breast height of greater than 20cm would be removed.

Class 3 – Regrowth areas requiring mechanical clearing (Plate 3)

Some areas contain thick regrowth material which would require mechanical clearing using a suitably equipped bulldozer equipped with a stick rake or blade with a width of approximately 2.5m. Removed vegetation and fallen timber would be pushed to the side to facilitate vehicular access. As far as practicable, no standing trees with a diameter at breast height of greater than 20cm would be removed.

The Company anticipates that of the proposed 23.5km of transect lines, the following approximate distribution of each of the above classes.

- Class 1 – Open areas requiring no mechanical clearing.....40%.
- Class 2 – Open areas requiring mechanical movement of fallen timber20%.
- Class 3 – Regrowth areas requiring mechanical clearing.....40%.

To minimise impacts associated with construction of the required transect lines, the following mitigation strategies would be implemented.

- The planned transects would be walked and flagged using field tape to ensure that access can be achieved with the minimum requirement need for any substantial soil or vegetation disturbance.
- Mature trees, namely those with a diameter at breast height of greater than 20cm would, as far as practicable, be avoided wherever possible and no hollow bearing trees would be removed.
- Whilst a survey for Aboriginal heritage has been completed (see Section 2.7 and **Appendix 3**), in the event that additional Aboriginal relics were to be observed during this process, the area would be avoided and the relevant authorities notified.



Plate 1: Open Area Not Requiring
Mechanical Clearing
(Source: Envirokey)

Plate 2: Open Area with Dense
Fallen Timber
(Source: Envirokey)



Plate 3: Regrowth Area Requiring
Mechanical Clearing
(Source: Envirokey)

Plate 4: Existing Access Track
(Ref: E925A_031)



- In the event that soil and underlying material requires removal to provide access, soil and water management measures would be implemented consistent with the requirements of *Managing Urban Stormwater – Unsealed tracks* (Volume 2) (DECC, 2008) and associated publications.

Furthermore, the Company would identify two areas of particular sensitivity, namely:

- waterfront land, or any land within 40m of a watercourse identified on **Figure 5**; and
- areas mapped as BR116: Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands, an Endangered Ecology Community (see Section and **Figure 6**).

These areas would be identified as “Controlled Areas” (**Figure 7**). The Company would implement the following additional management measures in these areas.

- The boundary of all Controlled Areas would be identified on the ground using flagging tape or similar to prevent inadvertent disturbance.
- No standing vegetation greater than 2m in height would, to the extent practicable, be disturbed.
- Soil disturbance would be limited to that required to establish the collar of any holes drilled within the identified areas.

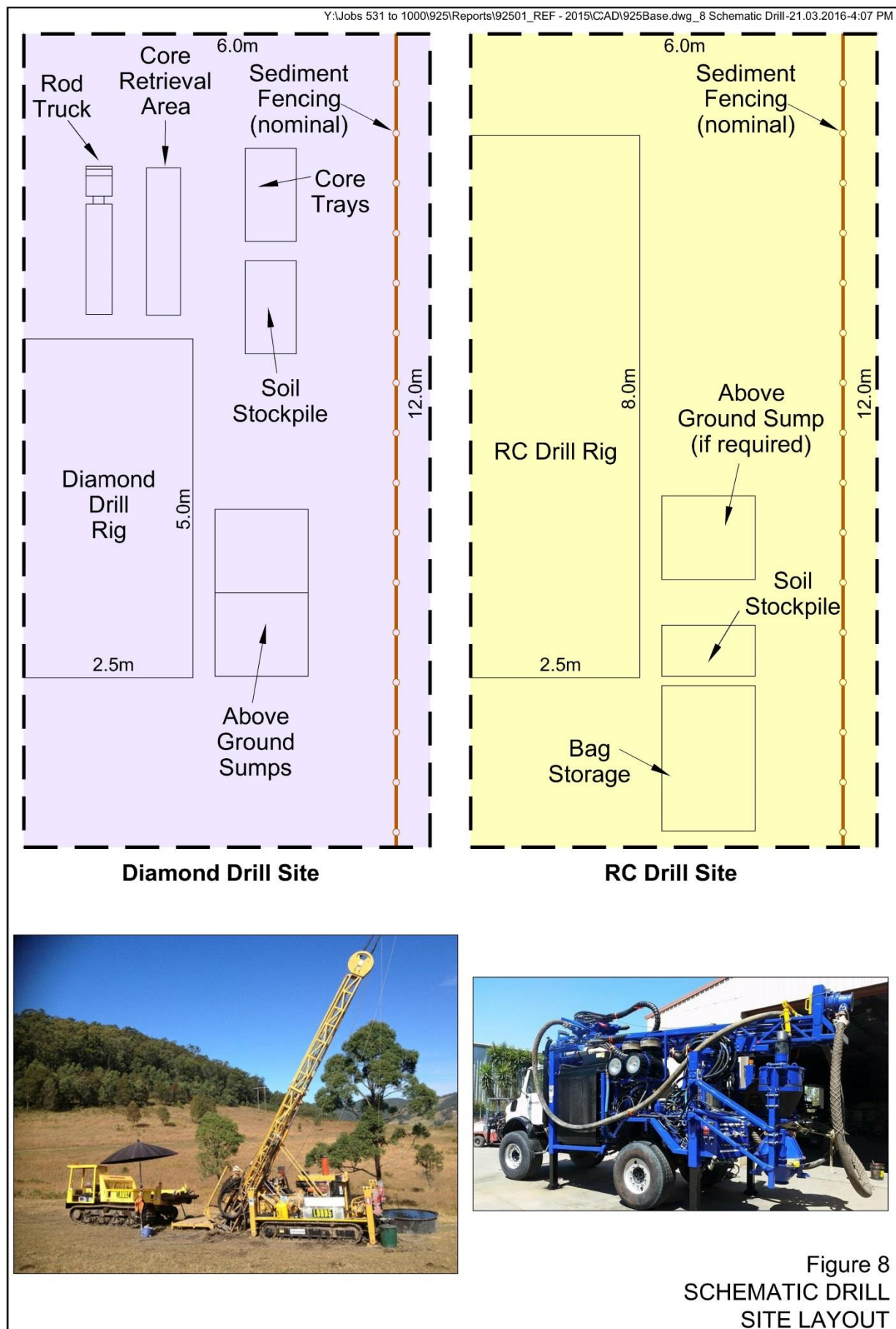
Finally, the Company would ensure that field personnel are aware of how to identify the vegetation community BR116: Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands and would implement the Controlled Areas procedures should additional areas of this vegetation community be identified.

4.2.3 Drilling Operations

A typical drill site layout for RC and DC drilling is shown in **Figure 8**. Drill sites would preferentially be located within the transect lines. It is noted that drill sites would typically be approximately 6m wide. As a result, limited additional removal of vegetation may be required to facilitate safe operation of the drill rig.

The following mitigation measures would be implemented to minimise potential impacts associated with the establishment of each drill site.

- Management of vegetation: Larger vegetation would be avoided by relocation of the drill collars as required. Removal of smaller vegetation and fallen timber would be managed as outlined in Section 4.2.2.
- Management of soil: No substantial ground disturbing activities are proposed. Where required soil and water management measures consistent with the requirements of *Managing Urban Stormwater – Unsealed tracks* (Volume 2) (DECC, 2008) and associated publications would be implemented. It is anticipated that this would be limited to the installation of sediment fencing.



- Equipment setup: The drill rig and support truck would be positioned and the above ground sump setup (as required for DC drilling) within the approximately 6m x 12m drill site generally in accordance with the layout presented in **Figure 8**.
- Management of safety: If drilling is likely to extend beyond that day's operations, a temporary high visibility fence to limit access to the drill site by non-inducted personnel would be installed. Given the shallow nature of the holes, most holes would be completed within a single shift.

In addition to the drill rig and support truck, other mobile equipment that would be utilised would include light vehicles for personnel transport and supply of water and other consumables and a mobile fuel tanker to refuel the drill rig (and support truck if necessary).

For both RC and DC drilling, each drill site would typically be approximately 6m wide and 12m long equating to a maximum area of up to approximately 72m² per drill site. It is noted that each drill site would be constructed on a transect line, as a result, the maximum additional disturbance associated with each drill site would be only 42m².

Drilling operations would involve drilling of holes with a diameter between 100mm and 150mm for RC and between 75mm and 120mm for DC drill holes and to a typical depth of approximately 30m and maximum possible depths of 50m. The shallow nature of the holes negates the need for a significant amount of additional equipment (e.g. only a limited number of drilling rods would be required) enabling minimal drill site footprints. Hours of operations would typically be limited to daylight hours, up to seven days per week and would require an on-site workforce of 4 people. Most portable equipment would be removed to Torrington overnight for security and all equipment would be removed during crew breaks (weekends or longer).

Water for the DC drilling would be supplied from an off-site source trucked to site on an as needs basis by the drilling contractor. Given the shallow depths, competent rock types and recycling of water, daily consumption is expected to be between 1,000L and 2,000L per day.

4.2.4 Decommissioning and Rehabilitation

Following completion of drilling operations at each drill site the following would be implemented as per the Company's Standard Operating Procedures (SOPs).¹

- Remove all drilling equipment, above-ground sumps, sample bags, other equipment and waste materials as soon as practicable.
- RC holes would be backfilled with drill chips and, where the casing cannot be extracted, it would be cut at least 300mm below ground level and backfilled to the level of the casing.
- DC holes would be cased through the upper, weathered section. The casing would be cut off at least 300mm below ground level and capped appropriately. Any cement footing holding the casing in place would be broken up and disposed of offsite.

¹ SOPs may be provided on request.

- Any excess drill chips, drill cuttings and remaining general waste would be removed from site and disposed of at a licenced landfill.
- Once no longer required, the transect lines and drill sites would be scarified to break up any compacted surfaces and facilitate natural regeneration. In the event that a development application is prepared for mining operations, transects within areas of proposed disturbance would not be rehabilitated.

At the completion of the drilling programme there would be a final inspection by the person responsible and the following would be implemented.

- In the unlikely event that natural regeneration has not been successful, disturbed areas would be spread with a seed mix determined in consultation with the landowner / Forestry Corporation of NSW.
- Ensure that appropriate surface water controls are in place to minimise the potential for erosion of spread topsoil prior to establishment of vegetation.

As per the Company's SOPs, during the planning, implementation and rehabilitation stages of the exploration activities, the following documentation would be maintained.

- Photographs of each area of disturbance, including along transect lines, would be taken prior to surface disturbing activities, during and after drilling of the hole and following rehabilitation of the area until such a time as no further monitoring is required. These photographs would be retained for future reference for any Rehabilitation Relinquishment reports as required by DRE.
- Records of relevant dates, including commencement of construction and drilling, finalisation of drilling and commencement and finalisation of rehabilitation.

4.3 STAKEHOLDER CONSULTATION

The Company has reviewed the *Exploration Code of Practice: Community Consultation* dated March 2016 and assigned the Activity Impact Assessment scores as outlined within the guideline (see **Table 6**).

In summary, with a Consultation Assessment Score of 13, the consultation category may be classified as "Low Impact" with consultation with the following required.

- Neighbouring landholders.

The Company has consulted with the owners of Lot 20 DP 753286 and has a written agreement in place relating to the proposed drilling programme.

The Torrington State Forest is owned and managed by the Forestry Corporation of NSW. The Company has been in frequent consultation with the Forestry Corporation of NSW throughout the planning of the proposed drilling program. No specific matters have been raised to date which influence the design of the drilling operations. It is proposed that frequent contact with the Forestry Corporation of NSW would continue during the drilling campaign.

Table 6
Activity Impact Assessment Scoring for Consultation

Assessment Component	Level of Impact	Score
Level of community interest	Low – low level of interest.	0
Activity type	High – >20 drill holes/km ² (Note: average density <20 holes/km ² over entire lease area).	10
Population Density	Low – sparsely populated ² .	0
Location - dwellings	Low – the village of Torrington (population approximately 65) is located approximately 5km southeast of the closest point of drilling. Six rural residences are located to the east of the REF Area, with the closest residence approximately 1.2km from the REF Area boundary.	0
Location - sensitive receivers (excluding dwellings)	Low – no sensitive receivers (excluding dwellings) are known to be within 15km of the REF Area.	0
Location – sensitive environment	High – the Torrington State Conservation Area is located within 5km of the REF Area. It is noted that recreational activities and fossicking is permitted within this area.	2
Cumulative impact	Low – the Sharpes Gravel Quarry is located approximately 23km south of the REF area.	0
Spatial impact	Medium – the ‘impact’ area as a result of the programme would be <10ha.	1
Temporal impact	Low – Drilling operations are expected to be completed in <6 months and would be relatively easily rehabilitated.	0
Visual impact	Low – activities will not be visible from surrounding residences or will be of a minor and short term nature.	0
Consultation Assessment Score		13

- Local community groups.

The Company has employed a long standing Torrington resident as its local representative and has supplied letters explaining its intentions on the ELs to the Country Women’s Association (CWA) to display in the Community Hall and also within the weekly mobile library. Private meetings by Company personnel with any local resident have been held on request and on an informal basis.

- Local government.

In addition to consultation with landholders, the Company has consulted with Tenterfield Shire Council regarding the proposed exploration programme and its progress on a regular basis since acquiring the project in early 2015. Council is supportive of the potential development opportunities and have raised no issues which influence the design of the drilling operations and potential future development.

Native Title has not been extinguished over the Torrington State Forest. However, the Torrington State Forest is not incorporated into any current Native Title Claims and, as part of the Right to Negotiate process associated with the transfer of EL8258 and EL8355 to the Company, no respondents or potential claimants were identified.

² Tenterfield (A) Statistical Local Area – Population 6 811 (ABS, 2011).

In accordance with the requirements of Table 3 of the *Exploration Code of Practice: Community Consultation* and *Condition 34* of EL8258 and 8355, the Company would undertake the following consultation prior to commencing exploration activities.

- Place an advertisement in both the Tenterfield Star and Glen Innes Examiner advising of:
 - the existence and extent of the exploration licences;
 - a contact person and phone number for inquiries, including an afterhours voice mail system;
 - where information is available on the Department's website regarding landholder's rights; and
 - the planned activities.
- A copy of the advertisement would be provided to Tenterfield Shire Council, the Torrington CWA and mobile library for display.
- Contact surrounding neighbours to advise them of the undertaking of the activity.
- Contact surrounding community organisations, including the Granite Borders Landcare Committee to advise them of the undertaking of the activity.

The consultation would include a general description of the proposed activities and planned impact minimisation / management measures.

4.4 ACCESS ARRANGEMENTS

As discussed in Section 3.3, written access arrangement has been reached with the owners of Lot 20, DP 753286 and remains current. As part of this REF process, an access agreement has also been negotiated with the Forestry Corporation of NSW. No other access arrangements are required and all conditions agreed to will be honoured the Company.

4.5 MITIGATION STRATEGY

4.5.1 Water Management Strategy

The Company would implement the following water management strategy to prevent impacts upon surface water resources.

- All areas of waterfront land, as defined under the *Water Management Act 2000*, namely land within 40m of the top bank of a watercourse, would be identified as a Controlled Area and the management measures identified in Section 4.2.2 would be implemented.
- Existing tracks would be used and crossing of drainage lines would be avoided wherever possible.
- Surface water structures would be installed generally consistent with the requirements of *Managing Urban Stormwater*, including silt-stop fences where required, to limit the transport of suspended sediment from disturbed areas.

- Aboveground lined drill sumps would be utilised to minimise disturbance and separate DC drilling fluids from surface water runoff.
- The underside of drill rigs would be lined with plastic and hessian to collect any spilt hydrocarbons.
- All hydrocarbons and other chemicals would be stored in a bunded container or on a self-bunding pallet.
- Hydrocarbon spill kits would be available at the active drill site.

4.5.2 Produced Water Management Strategy

Given the shallow nature of the proposed drilling and past records, no significant groundwater is expected to be encountered. However, in the event that small volumes of groundwater are intersected, the Company would implement the following strategies.

- All produced water from RC drilling would be captured within above-ground lined sumps.
- Where practicable, produced water would be reused for drilling-related operations.
- Where reuse is not practicable, the produced water would be tested to ensure that it complies with the following criteria and, if so, it would be irrigated to land adjacent the drill site.
 - Electrical Conductivity – $<350\mu\text{S}/\text{cm}$ (source: ANZECC (2000) for upland rivers in southeast Australia).
 - Suspended sediment – $<50\text{mg}/\text{L}$ or water completely clear.
 - Oil and grease – no visible oil or grease contamination.
- In the event reuse or discharge is not possible, produced water would either be evaporated or disposed of offsite at an appropriate facility.

The Company anticipates that the proposed activities would result in significantly less than 3ML per year of produced water, i.e. the volume of produced water would be below the required water licencing levels.

4.5.3 Hydraulic Fracturing (Well Stimulation)

Hydraulic fracturing is not proposed.

4.5.4 Waste and Chemical Management Strategy

Table 7 presents the hydrocarbons and chemicals that the drilling contractor would be likely to use during drilling operations. These would be stored on bunded pallets / storage units or, in the case of bulk diesel, within the self-bunded mobile fuel tanker.

Table 7
Indicative Drilling Chemicals

Product	Use	Hazardous Yes/No	Biodegradable Yes/No
Super-Trol	Viscosifier	No	Yes
FS-2000	Water viscosifier	No	Yes
Cement	Cementing casing	No	No
Gypset	Accelerator for cement	No	No
Rapidset	Accelerator for cement	No	No
Tacky DAF	Lubricate drill rods	No	Yes
D-Sperse	Flocculent to drop drill cutting out of water in sump	No	Yes
Floc-block, Floc-L	Flocculent to drop drill cuttings out of water in sump	No	Yes
KLA-Trol	Clay and shale stabiliser	No	Yes
Hammer Oil	Lubricate RC hammer	No	Yes
Drill foam	Detergent to assist in clearing hole	No	Yes
Aus Plug	Lost circulation material	No	Yes
Source: Torrington Minerals Pty Ltd			

Table 8 identifies the waste management strategy that would be implemented during the exploration program.

Table 8
Waste Management Strategy

Waste Type	Storage	Estimated Volume	Removal
General waste (including food scraps and used sample bags)	A small bin would be located within the general area of the drilling site footprint for the collection of general wastes	60 litre bin per day during drilling campaigns	The bin would be taken off site daily and emptied into a licenced general waste deposition site at Torrington.
Waste oils and greases	Placed within bunded storage container within the drilling site footprint	Approximately 1L to 30L per week depending on holes drilled ¹	Wastes would be collected as required during drilling and transported to an appropriately licensed facility for recycling or reuse
Reagent and Chemical Containers	All containers would be stored in a bunded area	Up to 10 containers per week depending holes drilled	Empty containers would be removed following the completion of drilling activities and either returned to the supplier or disposed of at a licenced facility
Drilling mud (liquid component)	Within on-site above ground drill sumps	Variable. Likely 1m ³ to 2m ³ per diamond drill hole	Recycled for other drill holes or allowed to evaporate
Drilling mud (solid component)	Within on-site above ground drill sumps	Variable	Allowed to dry out and, if no additives have been used, placed down drill hole or removed for off-site disposal at a licenced facility with EPA approval
Note 1: Equipment servicing would be undertaken off site. As a result, the anticipated amount of waste oil and grease is likely to be very limited			
Source: Torrington Minerals Pty Ltd			

The Company would implement the following mitigation strategies as per its SOPs to manage the risk of contamination or inappropriate chemical or waste management.

- Ensure all equipment is regularly inspected and maintained, including scheduled replacement of hydraulic hoses to minimise the risk of hydrocarbon spills.
- Place appropriate plastic liners or other absorbent materials in areas of potential hydrocarbon and chemical leaks or spills, including drill rigs and pumps.
- Ensure that all exploration personnel, including contractors, are trained and aware of the procedures and requirements of hydrocarbon and chemical materials management prior to the exploration programme commencing.
- Ensure that all exploration personnel, including contractors, are trained and aware of waste storage and disposal requirements.

4.5.5 Noise Management Strategy

The Company anticipates that the potential for noise related impacts is negligible based on:

- the distances to surrounding residences;
- the fact that the equipment to be used is small and would only operate during daylight hours (**Figure 8**); and
- the preferred drilling contractor has advised that the noise levels associated with the drill rigs proposed to be used have been measured at less than 35dB at a distance of 50m from the rigs.

Notwithstanding the above, the Company would liaise with surrounding residents during the proposed activities and would promptly respond to any complaint relating to noise. No additional management measures are considered necessary.

4.5.6 Air Quality Management Strategy

The Company would consult with the adjoining property owners prior to the commencement of drilling. Potential air quality issues would principally be managed through the use of dust collectors on the RC drill rig. The minimisation of ground disturbance when preparing site access and the drill sites would also reduce the potential for dust generation.

Given these management measures and the existing vegetation, which provides shielding from wind dispersion, no additional management measures are considered necessary.

4.5.7 Bushfire Management Strategy

Given the forested nature of the REF Area and surrounds, the Company would implement a bushfire management strategy in consultation with the Forestry Corporation of NSW and the Rural Fire Service. In summary, however, the following management measures would be implemented to manage the potential impact of a bushfire on personnel and equipment as well as the potential for a bushfire to be initiated by the activity:

- Machinery would be maintained and operated in a manner that would minimise the potential for a fire to start. This would include ensuring spark-free exhausts are fitted and all fuel, electrical and breaking systems are maintained in good order.
- Smoking would only be permitted within designated, cleared areas.
- Ensure appropriate fire extinguishers and other firefighting equipment is available to manage any fire-related incidents associated with the proposed activities.
- All employees would be trained in the proper use of firefighting equipment.
- A notification protocol would be developed with the Forestry Corporation of NSW for activities within the Torrington State Forest. This would include receipt of daily hazard category notifications.
- During high fire danger periods (in accordance with hazard category notifications), activities would be modified or restricted accordingly.
- An evacuation plan would be prepared in consultation with the Forestry Corporation of NSW and the Torrington Rural Fire Service.

4.6 JUSTIFICATION OF ACTIVITY AND ANALYSIS OF ALTERNATIVES

4.6.1 Justification of the Activity

4.6.1.1 Introduction

Throughout the planning of the proposed exploration activities, the Company has endeavoured to address each of the principles of Ecologically Sustainable Development. The following sub-sections draw together the features of the proposed activities that reflect the four principles of sustainable development, namely:

- the precautionary principle;
- the principle of intergenerational equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation, pricing and incentive mechanisms.

4.6.1.2 Precautionary Principle

Examples of matters relating to the precautionary principle that were considered during the planning of the exploration programme are listed below.

- Engagement of specialist consultants to assess the anticipated ecology and heritage-related impacts.
- Retention of flexibility to modify the placement of drill holes to avoid sensitive areas and minimise the risk of serious or irreversible environmental damage. Further details of the impact assessment are provided in Section 5.
- The Company would adopt a staged approach to the drilling, assessing and reassessing the drilling results progressively in order to minimise the number of drill holes required.
- The Company has identified areas of particular sensitivity and classified these as “Controlled Areas” (**Figure 7**). These areas would be the subject of additional management measures to ensure that disturbance is minimised to the extent practicable.

An assessment of environmental impacts were undertaken to determine the implications of the proposed exploration. The consequences of the exploration activity were rated low. Given this and the proposed approach, the risk of unforeseen impacts would be minimised.

4.6.1.3 Inter-generational Equity

The Company recognises that future generations should not be disadvantaged for the benefit of the current generation and accordingly has adopted an approach to minimise the disturbance footprint of its planned exploration activities. This is demonstrated by the flexible drill hole placement to avoid environmentally sensitive areas and rehabilitation following completion of drilling, which is considered would maintain the local biodiversity and amenity, particularly of the Torrington State Forest for future generations.

In terms of Aboriginal heritage, intergenerational equity has been considered in terms of the cumulative impacts to Aboriginal objects and places in a region. In the absence of any artefactual material of known specific Aboriginal association within the proposed area of disturbance, the impact of the proposed activity is assessed to be low.

4.6.1.4 Conservation of Biological Diversity and Ecological Integrity

The Company is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not adversely affect biological diversity or ecological integrity. As such, the activity has been designed to minimise impacts on the flora and fauna by using a number of mitigation measures including avoidance of mature trees and avoidance of tree removal within the area of the identified Endangered Ecological Community.

4.6.1.5 Improved Valuation and Pricing of Environmental Resources

The principles of this strategy would be applied to all exploration activities including the recycling of materials during drilling, segregation of waste materials and the disposal at a designated waste facility at the cost of the Company.

4.6.1.6 Conclusion

The proposed exploration activities are essential to further delineate areas of known mineralisation and identify new areas of mineralisation, which may lead to the development of a small-scale mining operation to produce tungsten and topaz in a water based gravity separation and concentration processing plant. Given that the anticipated residual environmental impacts of the proposed exploration activities would be limited to minor short-term impacts and that no long-term impacts are anticipated as a result, it is considered that the proposed activities are justified.

4.6.2 Analysis of Alternatives

In consideration of minimising impacts, the Company reviewed a number of alternatives to enable identification of the subsurface geology mineralisation within the Licence Area. These alternatives included:

- a review of previous geological assessments of the area;
- the use of different drilling techniques; and
- the placement of drill sites to minimise environmental impacts.

Given that all previous scant drilling records and geological assessment of the area have been evaluated and assessed, it was concluded that there is no other effective method except for drilling to further assess the geology and mineral prospectivity at depth. The drilling techniques and small-scale equipment to be used are also the most suitable given the shallow nature of the drilling and expected absence of groundwater.

The areas selected for these initial drilling programmes surround previously mined and known mineralised zones and were also considered in light of environmental aspects including ecology, heritage, water resources and access arrangements. It was also concluded that the selected areas and methods would minimise any additional environmental and social impacts.

Therefore, the Company contends that there are no feasible or less intrusive alternatives to the proposed drilling programmes to enable the further delineation of known mineralisation and the identification of new areas of mineralisation.

4.6.3 Consequences of Not Carrying Out the Activity

The proposed exploration activities are essential to further the progression of the Torrington Tungsten and Topaz Project and possible eventual development of an economic mining operation. Without completion of the proposed drilling program, future mining and associated benefits to the local community, to the State and to the Company could not eventuate.



5. IMPACT ASSESSMENT

5.1 ASSESSMENT OF PHYSICAL AND POLLUTION IMPACTS

5.1.1 Air Impacts

The principal air pollutant that would be generated by the proposed activities is particulate matter. The potential for adverse impacts from particulate matter would be negligible given:

- the implementation of the mitigation measures outlined in Section 4.5.6;
- the separation distance to surrounding residences (seven located within 5km and the closest located 1.4km east of the closest point of drilling – see Section 3.3); and
- the well vegetated nature of the REF Area and surrounds which would limit the dispersion of any dust that is generated.

The proposed activities do not involve any venting, flaring or other significant generators of greenhouse gas. The only sources of greenhouse gas would be from burning of diesel fuel for the operation of the drill rigs and support vehicles. Given the short duration of the drilling programme and scale of equipment, these emissions would be minimal.

No toxic or radioactive emissions would result from the proposed activities.

As a result, air quality impacts are expected to be **negligible**.

5.1.2 Water Impacts

As discussed in Sections 2.5.2 and 3.5.1, historic drilling and mining within and surrounding the REF Area has not recorded the presence of any groundwater and, given the shallow nature of the proposed drilling, no significant volume of produced water is expected to be encountered. Therefore, with the implementation of standard management practices, including the proposed hydrocarbon management and sealing of completed drill holes, it is considered that impacts upon groundwater quality or quantity would be **negligible**.

In relation to surface water, with the implementation of the proposed management measures (see Section 3.5.1) and the limited disturbance of soil material, the proposed activities would not result in:

- the redirection of flow or changes to flow rates or volumes;
- any changes to the area, volume or flow rates of any waterbody or watercourse;
- pollution of waters; or
- any changes to the local flood regime.

As identified in Section 3.2, the REF Area is not located within a drinking water catchment and the community does not rely upon surface water flows from the REF Area for water supply.

As a result, surface water impacts are expected to be **negligible**.

5.1.3 Soil and Stability Impacts

With the implementation of the proposed management measures, the proposed activities would not result in:

- any contamination, salinization or acidification of soil;
- any significant soil erosion or loss of soil structural integrity;
- any increase in land instability; or
- induced seismicity or ground movements due to fracture stimulation or injection / extraction of groundwater.

As discussed in Sections 4.2 and 4.3, the proposed activities would result in minimal soil disturbance and, where disturbance may lead to sedimentation, appropriate erosion and sediment controls would be installed. Notably, the soil profile is generally thin and a substantial portion of the resource identification areas have previously been disturbed by historic mining and exploration activities. The topography is also gentle with slopes ranging from 1° to 9° (locally) which minimises the erosion hazard.

As a result, soil and stability impacts are expected to be **negligible**.

5.1.4 Noise and Vibration Impacts

Given the rural nature of the area, in accordance with the *NSW Industrial Noise Policy 2000* the applicable noise criterion for surrounding residences would be 35dB(A).

Based on experience at similar drilling operations, compliance would be achieved during drilling operations at a distance of less than 1km. Indeed, the Company notes that the preferred drilling contractor has advised that the noise levels associated with the drill rigs proposed to be used have been measured at less than 35dB at a distance of 50m from the rigs.

As the closest residence is located approximately 1.4km from the closest point of drilling, compliance would be achieved at all surrounding residences. In addition, all drilling activities would be limited to daylight hours.

No blasting or other activities that would generate significant vibration would be undertaken.

As a result, noise and vibration-related impacts are expected to be **negligible**.

5.1.5 Other Physical or Pollution Impacts

The Company has considered other potential physical and pollution impacts and notes the following.

- Coastal Processes and Coastal Hazards.

The REF Area is not located within proximity to the coast and the proposed activities would not affect or be affected by coastal processes or coastal hazards.

- Hazardous Substances or Chemicals.

The likely drilling chemicals that may be utilised are outlined in Section 4.5.4. Only small volumes would be required due to the shallow nature of drilling and competent rock-types anticipated, with the majority of chemicals not considered hazardous. These chemicals would be stored and transported in accordance with the relevant Material Safety Data Sheets and are commonly used within RC and DC exploration drilling without resulting in pollution of the environment.

- Generation and Disposal of Waste.

Section 4.5.4 outlines the likely wastes to be generated, expected volumes and disposal methods. The wastes that would be generated are typical of RC and DC exploration drilling and would be collected, stored and disposed of in accordance with relevant policies and guidelines and records will be kept.

The potential impacts upon other physical parameters are considered to be **negligible**.

5.2 ASSESSMENT OF BIOLOGICAL IMPACTS

EnviroKey (2016) undertook an assessment of the significance of anticipated impacts to listed species and vegetation communities under the TSC Act and EPBC Act. That assessment is presented in Section 10 of EnviroKey (2016) (**Appendix 2**). In summary, EnviroKey (2016) determined that the proposed activities.

- would be unlikely to have a significant effect on species and communities listed under the TSC Act; and
- would be unlikely to have a significant impact on species and communities listed as threatened or migratory under the EPBC Act.

5.3 ASSESSMENT OF RESOURCE USE IMPACTS

5.3.1 Community Resources

The proposed activities would result in direct employment of approximately four to five persons on a full-time equivalent basis during the 3 to 4 month drilling programme. Employees would be accommodated in suitable rented facilities either in the Torrington Township or Deepwater Township. No exploration camp would be constructed. The proposed activities would also require a limited use of community services with consumables and maintenance relying upon existing drilling and civil contractors. The proposed activities would also not generate significant volumes of waste, all of which could be readily accommodated by existing waste facilities within the Tenterfield Local Government Area.

Given the above, it is expected that the proposed activity would not result in the degradation of or a significant increase in demand for services and infrastructure resources to the local or broader community. Therefore the impact would be **negligible**.

5.3.2 Natural Resources

The proposed activities would not significantly deplete natural resources with water and soils being protected and clearing of vegetation minimised. The Company has also determined in consultation with the Forestry Corporation of NSW that the vegetation that would be required to be cleared is not of commercial value and that the proposed drilling programme would not disrupt any future commercial use of the Torrington State Forest. No farming or agricultural activities are undertaken within the REF Area.

The drilling programme itself would not deplete extractive materials, rather it would better define important minerals for future beneficial exploitation.

Therefore, as the proposed activities would not significantly disrupt, deplete or destroy natural resources, the impact would be **negligible**.

5.4 ASSESSMENT OF COMMUNITY IMPACTS

5.4.1 Social Impacts

Given the small workforce and short-term nature of the activities, potential impacts upon the demographic structure of the community would not be noticeable. It is also considered that the environmental impacts would not cause any substantial change or distribution to the community, loss of facilities or loss of community identity. As a result, social impacts would be **negligible**.

5.4.2 Economic Impacts

Given the small number of employees and short duration of the proposed activity it is expected that there would be a slightly **positive** economic impact from the purchase of consumables, payment of accommodation, fuel and food etc.

5.4.3 Heritage Impacts

No known Aboriginal or historic heritage items are located within the REF Area and the closest potential historic heritage item, located approximately 500m west of the REF Area (see Section 3.8) would not be affected by the proposed activities. Therefore, the potential heritage impacts are considered **negligible**.

5.4.4 Aesthetic Impacts

The proposed activities would be largely shielded by surrounding topographic features and woodland vegetation. The proposed activities do not involve any venting or flaring of gas and, with the implementation of the proposed air quality measures, would not result in significant visual dust generation. In addition, as all activities would be undertaken during daylight hours, there would be no night-time lighting impacts.

It is accepted that, at times the drill rigs and support vehicles may be visible from surrounding vantage points, including the Thunderbolts Lookout located approximately 4.8km southeast of the closest point of the REF Area. However, given the small scale of activities, limited duration, separation distances to the surrounding vantage points and screening vegetation, potential aesthetic impacts would be **negligible**.

5.4.5 Cultural Impacts

The due diligence assessment completed by McCardle Cultural Heritage Pty Ltd (see **Appendix 3**) identified no cultural heritage sites or PAD and assessed that the potential for artefacts to occur was low or negligible. Therefore, it was concluded that there would be no impacts upon the archaeological record. As a result, impacts on cultural heritage would be **negligible**.

5.4.6 Land Use Impacts

The Company has consulted with the Forestry Corporation of NSW and the owners of Lot 20 DP 753286 regarding potential disruption of current land uses and has determined that the proposed activities would not result in any major changes to land use or significant curtailment of other beneficial uses. The proposed activities would also not result in any significant impact upon property values with land use implications.

No land within or surrounding the REF Area is identified as Strategic Agricultural Land and no agricultural land would be impacted. Consistent with the *Guideline for Agricultural Impact Statements at the Exploration Stage*, given that the land is considered likely to have a land capability classification of Class 7 and no agricultural activities are undertaken within the REF Area or within 500m of the REF Area, no further agricultural assessment has been completed.

Therefore, potential land use impacts are considered **negligible**.

5.4.7 Transportation Impacts

Light vehicle movements would be limited in number with between approximately three and five trips (six to ten movements) per day. These movements would be associated with the drilling team, any government representatives and transport of consumables. Heavy vehicle movements would be limited to transportation of the drill rigs and bulldozer to / from the REF Area and potentially small heavy vehicles transporting consumables. These movements would be infrequent.

Given the minimal volume of traffic associated with the proposed activities and the existing low traffic volumes, the proposed activities would have a **negligible** impact upon the existing transportation network and users.

5.5 IS THE PROPOSED ACTIVITY LIKELY TO IMPACT ON MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE UNDER THE COMMONWEALTH ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999?

EnviroKey (2016) determined that the proposed activities would be unlikely to have a significant impact on threatened and migratory biota listed under the EPBC Act.

5.6 ASSESSMENT OF CUMULATIVE IMPACTS

The Exploration Licence Area does not overlap with any other mining or petroleum leases or licences and no other existing or proposed activities are known within the vicinity of the REF Area that could result in cumulative impacts with the proposed activities. As a result, cumulative impacts would be **negligible**.

6. SUMMARY OF IMPACTS

Table 9 provides a summary of the anticipated environmental impacts associated with the proposed activities and the overall ranking of potential significance. In summary, the proposed activities would have a negligible impact across the majority of physical and community parameters. However, a low adverse ranking has been adopted given the rankings for biological impacts which have been assessed in consideration of the total potential disturbance of 8.39ha.

Table 9
Summary of Potential Impacts

Page 1 of 3

Impacts	Size	Scope	Intensity	Duration	Level of Confidence in predicting impacts	Resilience of environment to cope with impacts?	Level of reversibility of impacts?	Ability to manage or mitigate impacts	Ability of the impacts to comply with standards, plans or policies?	Level of public interest	Requirement for further information on the impacts of the activity or mitigation	Ranking of potential significance
Physical or Pollution Impacts												
Air	Small scale	Localised	Low 1 to 2 drill rigs operating for a limited period	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.6)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Water	Small scale	Localised No significant surface water resources to be traversed No sensitive aquifers, groundwater dependent ecosystems or groundwater users	Low Limited water take (<3ML/y)	Short	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.1)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Soil and Stability	Medium scale	Localised	Low Low fertility soils No features of particular sensitivity	Drilling programme completed within approximately 3 to 4 months with progressive rehabilitation of drill sites	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.1, 4.5.8)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Noise and Vibration	Small scale	Localised	Low 1 to 2 drill rigs operating for a limited period during daylight hours only	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.5)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Coastal Processes and Hazards	Issue not relevant											
Hazardous Substances and Chemicals	Small scale	Localised Drilling chemicals and hydrocarbons only	Low Small quantities stored in bunded containers	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.4)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Wastes	Small scale	Localised Wastes removed each day	Low Small quantities of waste generated	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available (Section 4.5.4)	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible

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Table 9 (Cont'd)
Summary of Potential Impacts

Page 2 of 3

Impacts	Size	Scope	Intensity	Duration	Level of Confidence in predicting impacts	Resilience of environment to cope with impacts?	Level of reversibility of impacts?	Ability to manage or mitigate impacts	Ability of the impacts to comply with standards, plans or policies?	Level of public interest	Requirement for further information on the impacts of the activity or mitigation	Ranking of potential significance
Biological Impacts												
Flora and Fauna	Small scale	Localised Proposed activity would result in disturbance of up to 8.39ha within an ecology Study Area of 690ha	Low Limited disturbance, with larger vegetation to be avoided	Short Drilling programme completed within approximately 3 to 4 months	High Ecology study completed by EnviroKey	High Scale of disturbance small in context of remaining habitat	High Natural revegetation likely to become re-established quickly	Effective mitigation measures available	EnviroKey (2016) determined that significant impacts unlikely based on legislative standards	Low	High level of understanding based on EnviroKey (2016)	Low
Ecology	Small scale	Localised Proposed activity would result in disturbance of up to 8.39ha within an ecology Study Area of 690ha	Low Limited disturbance, with larger vegetation to be avoided	Short Drilling programme completed within approximately 3 to 4 months	High Ecology study completed by EnviroKey	High Scale of disturbance small in context of remaining habitat	High Natural revegetation likely to become re-established quickly	Effective mitigation measures available	EnviroKey (2016) determined that significant impacts unlikely based on legislative standards	Low	High level of understanding based on EnviroKey (2016)	Low
Resource Use Impacts												
Community	Small scale	Localised Proposed activity is unlikely to increase the demand for services or degrade those that are currently available	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Natural Resources	Small scale	Localised Proposed activity is unlikely to disrupt, deplete or destroy natural resources	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Community Impacts												
Social Factors	Small scale	Localised Proposed activity is unlikely to effect the demographic structure of the community or disrupt or disadvantage any particular component of the community	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Economic Factors	Small scale	Localised Proposed activity is likely to generate a small amount of income for the community	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience elsewhere	Positive to Negligible

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Table 9 (Cont'd)
Summary of Potential Impacts

Page 3 of 3

Impacts	Size	Scope	Intensity	Duration	Level of Confidence in predicting impacts	Resilience of environment to cope with impacts?	Level of reversibility of impacts?	Ability to manage or mitigate impacts	Ability of the impacts to comply with standards, plans or policies?	Level of public interest	Requirement for further information on the impacts of the activity or mitigation	Ranking of potential significance
Community Impacts (Cont'd)												
Heritage Impacts	Small scale	Localised Proposed activity will not impact on items of historic heritage	Low	Short	High	High	Impacts reversible	Effective mitigation measures available	Compliance almost certain	Low	High level of understanding and information on the impact based on prior experience elsewhere	Negligible
Aesthetic Impacts	Small scale	Localised	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience	Negligible
Cultural Impacts	Small scale	Localised No cultural heritage items identified.	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts irreversible	Effective mitigation measures available	Compliance almost certain	Low	High level of understanding and information on the impact based on survey and prior experience	Negligible
Land Use	Small scale	Localised	Low	Short Drilling programme completed within approximately 3 to 4 months	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience	Negligible
Transportation	Small scale	Localised	Low	Short Limited vehicle movements over approximately 3 to 4 month program	High	High	Impacts reversible	Effective mitigation measures available	No standards, plans or policies apply	Low	High level of understanding and information on the impact based on prior experience	Negligible
Ranking of Activity as a Whole												
Generally the proposed activities would have a negligible impact across the majority of physical and community parameters. However, a low adverse ranking has been adopted given the rankings for biological impacts which have been assessed in consideration of the total <u>potential</u> disturbance of 8.39ha												Low Adverse

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7. CONCLUSIONS

The Company contends that the proposed activities would:

- be unlikely to have a significant effect on the environment, threatened species, population, ecological community or their habitats;
- not affect critical habitat;
- not result in permanent and adverse changes to the environment; and,
- not result in further unacceptable impacts to land that is already stressed or cumulative impacts that would be unacceptable.

Furthermore, the Company contends that there is a high level of confidence in relation to the determined impacts and that the proposed activities would not, therefore, result in unacceptable impacts.

8. STATEMENT OF COMMITMENTS

Table 10 provides a description of the Statement of Commitments for the proposed exploration activities.

Table 10
Statement of Commitments

Page 1 of 3

Item	Commitment
Activity Type	<p>Exploration activity comprising the following.</p> <ul style="list-style-type: none"> • Construction of up to 23.5km of transects approximately 2.5m wide. • Drilling of between 15,000m and 17,000m of RC and DC drill holes with a typical depth of up to approximately 30m based on previous drilling, but could be deeper if silexite continues below 30m. • Construction of drill sites along transects, with an additional disturbance area of approximately 42m² per site. • Ancillary hand sampling of waste material from historic mining operations.
Activity Location	<p>Within EL 8258 and EL 8355, Torrington NSW.</p> <p>Activities would occur within the Torrington State Forest and Lot 20 DP 753286.</p>
Activity Scope (including any ancillary activities)	<p>Limited vegetation clearing for access and drill sites.</p> <p>Operation of drill rigs and ancillary support equipment.</p> <p>Rehabilitation of areas disturbed by the proposed activities</p>
Hours of Operation	Daylight hours up to 7 days per week.
Activity Duration	Approximately 3 to 4 months from commencement pending dependant on drilling results, weather and equipment availability.
Proposed Commencement Date	Third quarter of 2016, pending receipt of all approvals and completion of the right to negotiate process and subsequent approval of the proposed activities.
Proposed Completion Date	Indicatively early first quarter of 2017.
Maximum Area of Disturbance	<p>8.39ha as follows.</p> <ul style="list-style-type: none"> • Up to 600 drill sites at 42m² per site = 2.52ha. • 23.5km of transect lines at 2.5m wide – 5.87ha. <p>Disturbance areas may be classified as follows.</p> <ul style="list-style-type: none"> • Class 1 – Open areas requiring no mechanical clearing – 40% or 3.36ha. • Class 2 – Open areas requiring mechanical movement of fallen timber – 20% or 1.67ha. • Class 3 – Regrowth areas requiring mechanical clearing – 40% or 3.36ha.
Rehabilitation Commitments and Timeframes	Progressively throughout drilling programme and completion of rehabilitation audit following drilling program.
Management Measures	
General	<ul style="list-style-type: none"> • Undertake operations generally in accordance with the following. <ul style="list-style-type: none"> – <i>Exploration Code of Practice: Environmental Management.</i> – <i>Exploration Code of Practice: Produced Water Management, Storage and Transfer.</i> – <i>Exploration Code of practice: rehabilitation.</i> – <i>Exploration Code of Practice: Community Consultation.</i>

Table 10 (Cont'd)
Statement of Commitments

Page 2 of 3

Item	Commitment
Management Measures (Cont'd)	
Air Quality	<ul style="list-style-type: none"> Consult with the adjoining property owners prior to the commencement of drilling. Ensure that dust suppression equipment is used at all times to limit dust emissions. Minimise ground disturbance.
Protection of Water Sources	<ul style="list-style-type: none"> In areas within 40m of the bed or banks of drainage lines identified on Figure 5 ensure, to the extent practicable, that: <ul style="list-style-type: none"> no standing vegetation greater than 2m in height would be disturbed; and soil disturbance would be limited to that required to establish the drill collar. Ensure that any water produced during drilling operations is captured and passed to one or more above ground drill sumps, as required. Ensure water is not discharged from the drill sumps unless the following criteria are achieved. <ul style="list-style-type: none"> Electrical Conductivity – <350µS/cm. Suspended sediment – <50mg/L or water completely clear. Oil and grease – no visible oil or grease contamination. Ensure that produced water volume is <3ML/year.
Erosion and sediment controls	<ul style="list-style-type: none"> Install sediment and erosion control measures, including silt stop fencing, in accordance with Managing Urban Stormwater. Utilise existing tracks wherever possible and avoid crossing drainage lines where possible.
Noise and vibration	<ul style="list-style-type: none"> Undertake drilling operations during daylight hours only.
Use of chemicals, fuels and lubricant	<ul style="list-style-type: none"> Ensure all equipment is regularly inspected and maintained, including scheduled replacement of hydraulic hoses to minimise the risk of hydrocarbon spills. Place appropriate plastic liners or other absorbent materials in areas of potential hydrocarbon leaks (e.g. the underside of the drill rigs). Ensure that all exploration personnel, including contractors, are trained and aware of the procedures and requirements of hydrocarbon and chemical materials management prior to the exploration programme commencing. Ensure that all hydrocarbons and chemicals are stored in accordance with Australian Standard AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. Ensure that all exploration personnel, including contractors, are trained and aware of waste storage and disposal requirements.
Waste	<ul style="list-style-type: none"> Ensure that all wastes are removed from site for disposal at a licenced waste facility.
Ecology, fauna and livestock	<ul style="list-style-type: none"> Clearly mark disturbance areas and limit disturbance to marked areas. Ensure transects are approximately 2.5m wide. Ensure that disturbance of trees with a diameter at breast height of 20cm is limited to the extent practicable. Ensure that disturbance of vegetation greater than 2m in height within Controlled Areas, namely areas of EEC or within 40m of mapped water courses (See Figure 7), is limited to the extent practicable. Ensure machinery is cleaned of soil prior to arriving on site. Ensure that a suitably trained person inspects areas of proposed disturbance for threatened flora species prior to clearing activities. Where such species are located, the disturbance area would be relocated.

Table 10 (Cont'd)
Statement of Commitments

Page 3 of 3

Item	Commitment
Management Measures (Cont'd)	
Aboriginal cultural and historic heritage	<ul style="list-style-type: none"> Ensure that all personnel involved in ground disturbance are trained in locating, identifying and avoiding Aboriginal objects and their legislative protection under the <i>National Parks and Wildlife Act 1974</i>.
Weeds, pests and diseases	<ul style="list-style-type: none"> Ensure that all vehicles, machinery, equipment and work boots are inspected and cleaned prior to arriving on site.
Rehabilitation commitments and timeframes	<ul style="list-style-type: none"> Remove drilling equipment and materials as soon as practicable following completion of drilling operations. Backfill holes where practicable and remove or cut off and cap casing and bury collar. Scarify all drill sites and transect lines not required for future mining operations to facilitate natural revegetation. Spread a suitable seed mix where natural revegetation has not been successful. Maintain a photographic record of rehabilitated areas in accordance with the Company's Standard Operating Procedures.
Other regulatory approvals required.	<ul style="list-style-type: none"> None.
Community consultation	<ul style="list-style-type: none"> Ensure that consultation is undertaken in accordance with the <i>Draft Exploration Code of Practice: Community Consultation</i> and <i>Condition 34</i> of EL8258 and 8355.
Complaint management	<ul style="list-style-type: none"> Implement the Company's Complaints Management Procedure and provide contact details to all those consulted. Ensure staff are available to be contacted seven days a week and that an afterhours message service is available.
Incident management	<ul style="list-style-type: none"> Implement the Company's Incident Management Procedure in the event of an incident. Notify relevant government agencies, including the DRE, as required.
Monitoring	<ul style="list-style-type: none"> Ensure that activities undertaken are documented daily through drillers logs and project manager diary notes. Ensure that site inspections and checklists are completed before, during and after exploration, activities, including photographs in accordance with the Company's SOPs.
Continuous Improvement	<ul style="list-style-type: none"> No additional measures identified.
Reporting	<ul style="list-style-type: none"> Ensure that reporting is completed in accordance with the requirements of EL8258 and EL8355.
Other	<ul style="list-style-type: none"> Ensure that bushfire alert levels are reviewed daily in consultation with the Forestry Corporation of NSW to ensure that proposed activities are appropriate to that day's fire danger risk rating.

9. REFERENCES

ANZECC (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Cropper (1993). *Management of Endangered Plants.* CSIRO Publishing, Melbourne.

EnviroKey (2016). *Ecology Assessment, Torrington Tungsten & Topaz Project*, prepared for R.W. Corkery & Co. Pty Limited on behalf of Torrington Minerals Pty Ltd, May 2016.

McCardle Cultural Heritage Pty Ltd (2016). *Proposed Exploration Program for the Torrington Tungsten and Topaz Project - LGA: Tenterfield - Aboriginal Heritage Due Diligence Assessment - 9 May 2016*, prepared for R.W. Corkery & Co. Pty Limited on behalf of Torrington Minerals Pty Ltd, May 2016.

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Appendices

(Total No. of pages including blank pages = 258)

- Appendix 1 ESF4 – Exploration Activities Application Form
- Appendix 2 Ecological Assessment
- Appendix 3 Cultural Heritage Assessment



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Appendix 1

ESF4 – Exploration Activities Application Form

(Total No. of pages including blank pages = 56)

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Form ESF4

Application to conduct exploration activities

For assessable prospecting operations

Mining Act 1992 and Petroleum (Onshore) Act 1991

March 2016 | v2.2

More information

For help with lodging this application, or for more information
about environmental assessment conditions in New South Wales, contact:

Division of Resources and Energy

Environmental Sustainability Unit

Phone +61 2 4931 6590

minres.environment@industry.nsw.gov.au

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The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Industry, Skills and Regional Development or the user's independent advisor.

Privacy statement

This information is collected by the Department of Industry, Skills & Regional Development (NSW Department of Industry) for the purposes of assessing an application for an authorisation or associated with an authority as required by the *Mining Act 1992*, *Mining Regulation 2010*, *Petroleum (Onshore) Act 1991* and *Petroleum (Onshore) Regulation 2007*.

This information may also be used by the department to confirm applicant details in the event that subsequent applications are made, and may also be used to establish and maintain databases to assist the department with its work generally.

Except for purposes required by law, the information will not be accessed by any third parties in a way that would identify the person without the consent of that person.

The department may make the information in the Form and any supporting information available for inspection by members of the public, including by publication on the department's website or by displaying the information at any of its offices. If you consider any part of your application to be confidential, please provide that part in a separate addendum clearly marked "Confidential".

The department may also provide the information to other government agencies for the purposes of its assessment. You may apply to the department to access and correct any information the department holds if that information is inaccurate, incomplete, not relevant or out of date.

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

When to use this form

Complete this form if you are applying for approval to conduct assessable prospecting operations in New South Wales.

You **do not** need to complete this form if you are conducting prospecting operations identified as exempt development under [State Environmental Planning Policy \(Mining, Petroleum Production and Extractive Industries\) 2007](#).

This form has been prepared and approved in accordance with the *Mining Act 1992*, *Mining Regulation 2010*, *Petroleum (Onshore) Act 1991* and *Petroleum (Onshore) Regulation 2007*. The information requested in this form may not be specifically referenced in the *Mining Act 1992*, *Mining Regulation 2010*, *Petroleum (Onshore) Act 1991* and *Petroleum (Onshore) Regulation 2007*, however its inclusion in the approved form validates the authority of the NSW Department of Industry, Division of Resources and Energy (the department) to request it.

If there is insufficient room in the fields please provide the information as an attachment.

Important notes

Any information or template that is required to accompany this application should be lodged within **10 business days of the lodgement date**. Failure to supply the information within this timeframe may be considered as grounds for refusing the application according to [Schedule 1B, Clause 6\(d\)](#) of the *Mining Act 1992*.

If this application is lodged by any party other than the authority holder (ie. an agent), the department may seek confirmation of that authority and any limits of that authority (*Mining Act 1992* [Section 163F](#) and *Mining Regulation 2010* [Clause 78A](#)).

The department may make the information in the form and any supporting information available for inspection by members of the public, including by publication on the department's website or by displaying the information at any of its offices. **If you consider any part of your application to be confidential, please provide that part in a separate addendum clearly marked "Confidential".**

Before you complete this form

Please read the following guides before completing this form:

- [ESG5: Assessment Requirements for Exploration Activities](#).
- [ESG2: Guideline for preparing a Review of Environmental Factors](#)
- [Guideline for Agricultural Impact Statements at the Exploration Stage](#).

Exploration in exempted areas

Exempted areas are defined in the *Mining Act 1992* and the *Petroleum (Onshore) Act 1991* as lands set aside for public purposes. Exempted areas include travelling stock routes, road reserves, water supply reserves, state forests, state conservation areas and public reserves/commons.

The Minister's consent is required before the department can approve exploration activities in exempted areas.

This application cannot be processed until Ministerial consent has been obtained.

To apply for approval to prospect in an exempted area, contact the Titles Services office by phone: (02) 4931 6500 or email: titles.services@industry.nsw.gov.au.

Exploration in State Conservation Areas

The [Office of Environment and Heritage](#) is responsible for management of [State Conservation Areas](#) (SCAs) under the [National Parks and Wildlife Act 1974](#). **This application cannot be processed until approval from the Office of Environment and Heritage has been obtained.** If you are applying to carry out activities in a State Conservation Area, you must first obtain the following before your application can be processed by the department:

- approval from the Minister administering the *National Parks and Wildlife Act 1974* ([Section 47J\(7\)](#))
- a Review of Environmental Factors (REF) approved by the Office of Environment and Heritage.

Requests for approval to prospect in a SCA are to be submitted to the relevant regional office of the [National Parks and Wildlife Service](#).

NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

Surface Disturbance Notice

The conditions of some older authorities require authority holders to provide a Surface Disturbance Notice before carrying out exploration activities. This application is regarded as a Surface Disturbance Notice (SDN) for the notification of exploration activities.

How to submit this form

- **By email:** Send an electronic copy of the form including any attachments to minres.environment@industry.nsw.gov.au
- **By mail:** Mail your form and attachments to: Division of Resources and Energy, Environmental Sustainability Unit, PO Box 344, Hunter Region Mail Centre NSW 2310.
- **In person:** Submit your application in person at the Division of Resources and Energy's Environmental Sustainability Unit, 516 High Street, Maitland, New South Wales. Office hours are 9.30am to 4.30pm.

How this application will be processed

Once your application has been registered and checked, it will be assessed by the department. The Minister for Resources and Energy (or their delegate) will consider the department's recommendation and all relevant information, and may propose to grant or refuse the application.

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

1 Authority details

Exploration licence (EL) or Assessment lease (AL) number	EL8258 and EL8355	Act	1992
Authority expiry date	EL8258 - 16/4/2017 EL8355 - 18/3/2018		

2 Authority holder/s details

Provide the full name of authority holder/s and if applicable, the ACN or ARBN (for foreign companies).

Name	Torrington Minerals Pty Ltd
ACN / ARBN	604431370
Registered street address	PO Box 15505, City East, BRISBANE QLD 4002
Postal address	<input checked="" type="checkbox"/> Same as above <input type="checkbox"/>

Name	
ACN / ARBN	
Registered street address	
Postal address	<input type="checkbox"/> Same as above <input type="checkbox"/> Enter here if different

Name	
ACN / ARBN	
Registered street address	
Postal address	<input type="checkbox"/> Same as above <input type="checkbox"/> Enter here if different

Additional authority holders

Provide the full name, ACN or ARBN (for foreign companies), registered street address and postal address details of additional authority holders.

Not applicable

3 Contact for this application

Any correspondence relating to this application will be sent to this person.

Contact name	Dr Leon Pretorius
Position held	Executive Chairman
Company	Torrington Minerals Pty Ltd
Postal address	PO Box 15505, City East, BRISBANE QLD 4002
Phone (inc. area code)	07 3232 3405
Mobile	0419 702 616
Email	info@toptung.com.au

Your preferred contact method

- ☒ Email (For companies – provide a generic company email address which is regularly monitored rather than an individual employee's email address.)
- ☐ Mail

4 Exempted areas

Exempted areas are defined in the *Mining Act 1992* and *Petroleum (Onshore) Act 1991* as lands set aside for public purposes, which includes travelling stock routes, road reserves, water supply reserves, state forests, state conservation areas and public reserves/commons. Exempted areas require Ministerial consent – **this application cannot be processed until Ministerial consent has been obtained.**

4.1 Will the activity include prospecting in an exempted area?

- ☐ No. ▶ Go to Question 5
- ☒ Yes. ▶ Continue to Question 4.2

4.2 Prospecting in exempted areas

4.2.1 Minister's consent

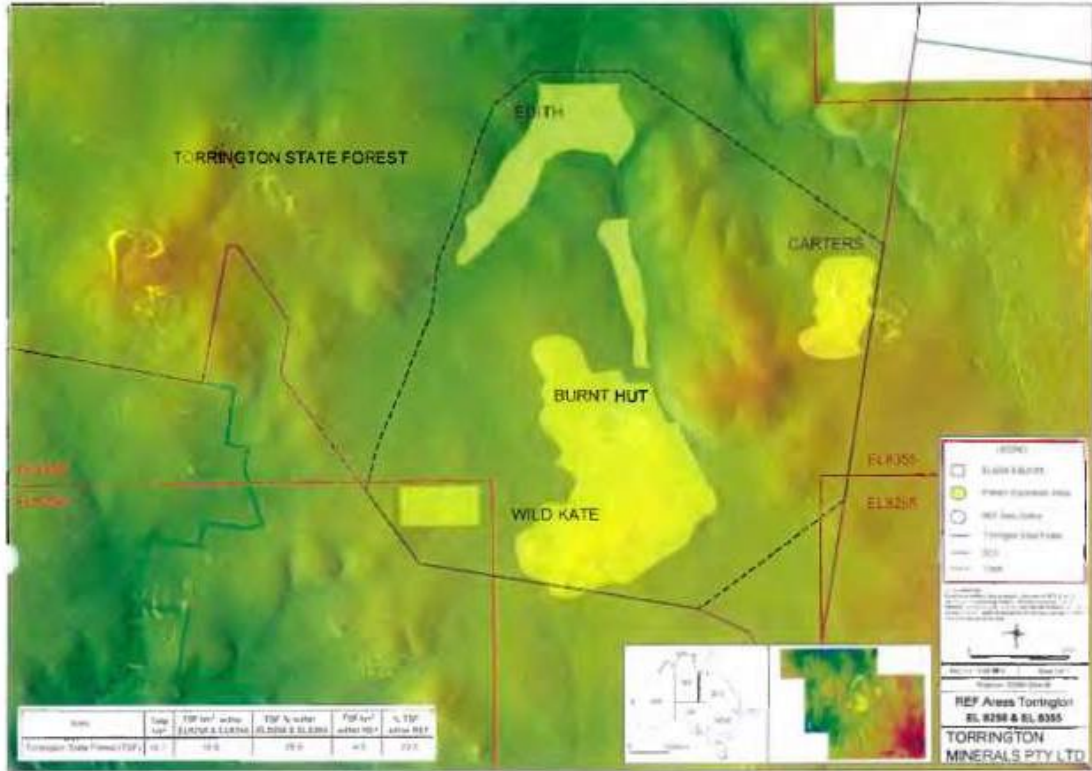
Attach a copy of the Minister's consent to prospecting in exempted areas. To apply for approval to prospect in an exempted area, contact the Titles Services office by phone (02) 4931 6500 or email titles.services@industry.nsw.gov.au.

- ☒ I have attached a copy of the Minister's consent to prospect in an exempt area.

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

4.2.2 Identify exempted areas

Identify the exempted areas where prospecting activities will take place:



Insert a map in the field above or enter your text here

5 State Conservation Areas

If you are applying to conduct prospecting activities in a [State Conservation Area](#), you must obtain the approvals below (Question 5.2) before your application can be processed by the department.

5.1 Will the activity include prospecting in a State Conservation Area?

- ☒ No. ▶ **Go to Question 6**
- ☐ Yes. ▶ **Complete Questions 5.2, 6, 8, 16, 17 and 18 only.**

5.2 Prospecting in a State Conservation Area

5.2.1 Minister's consent

If you are applying to carry out activities in a State Conservation Area, you must obtain approval from the Minister administering the *National Parks and Wildlife Act 1974* ([Section 47J\(7\)](#)).

- ☐ I have attached a copy of the Minister's consent to prospect in a State Conservation Area.

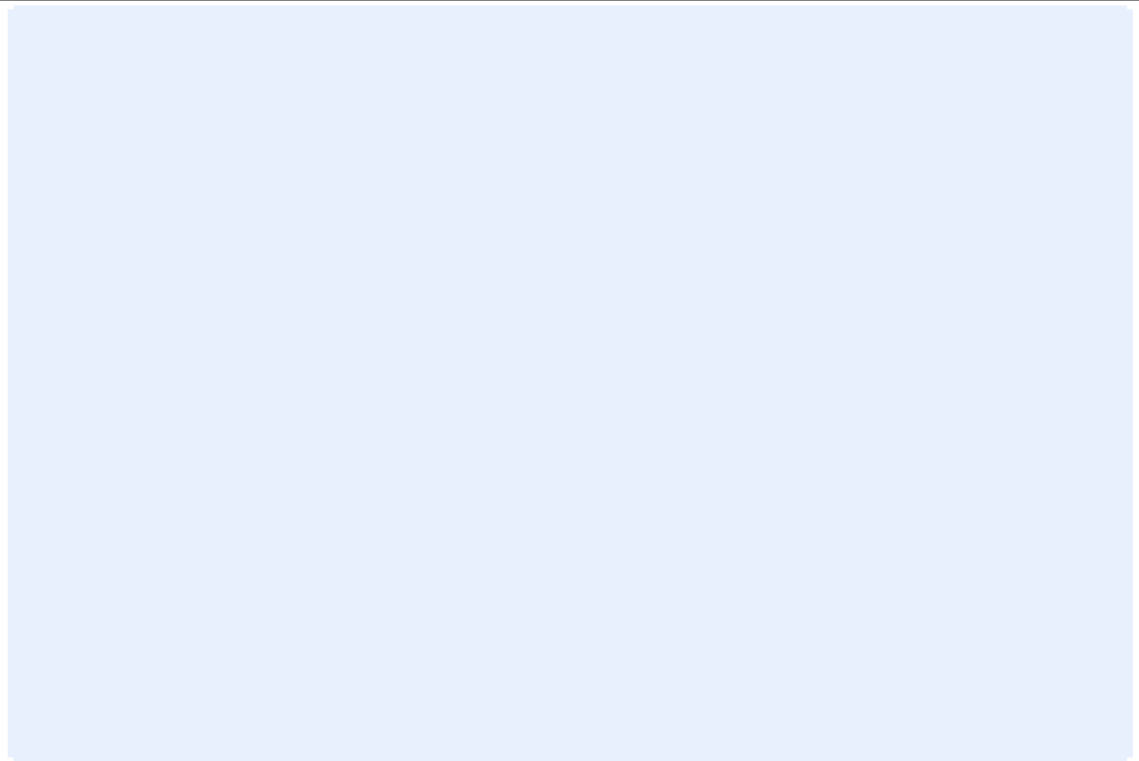
5.2.2 Review of Environmental Factors

The [Office of Environment and Heritage](#) manages State Conservation Areas under the [National Parks and Wildlife Act 1974](#). If you are applying to conduct prospecting activities in a State Conservation Area, you must provide the department with a [Review of Environmental Factors](#) which has been approved by the Office of Environment and Heritage.

- ☐ I have attached a copy of the Review of Environmental Factors approved by the Office of Environment and Heritage.

5.2.3 Identify the State Conservation Area

Identify the State Conservation Area/s where prospecting activities will take place.



Insert a map in the field above or enter your text here

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

6 New application or modification of approved exploration activities

To modify an already approved exploration activity, the modification must be consistent with the existing approval and have environmental impacts consistent with those already assessed and approved. Otherwise, a new application for the entire activity must be made.

6.1 Is this a new application for approval or an application to modify an existing approved activity?

<input checked="" type="checkbox"/>	New application for approval. Complete the details below, then go to Question 7 .
Project name	Torrington Tungsten and Topaz Project
Project location	Torrington

OR

<input type="checkbox"/>	Modification of an approved application. Complete the details below, then continue to Question 6.2, 9, 16, 17 and 18 only .
Approved project or activity name	
Date of previous approval	
Reason for modification	

6.2 Modification of an approved application

Describe the modification to the approved application and the environmental impacts.

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NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

7 Application type and assessment requirements

Environmental assessment requirements vary depending on whether a proposed activity is a 'Common Exploration Activity' or a 'Non-Common Exploration Activity'. Refer to Section 4 of [ESG5 Assessment Requirements for Exploration Activities](#) to determine whether a proposed activity is a Common Exploration Activity or a Non-Common Exploration Activity.

Petroleum exploration activities are not eligible to be assessed under the Common Exploration Activity assessment pathway.

Select one application type and assessment pathway only.

☐

Common Exploration Activity (minerals or coal authorities only)

Complete all questions in this form, apart from **Questions 10 and 15**.

Note: Information provided in this form regarding an activity which meets the Common Exploration Activity criteria will be taken to be a Review of Environmental Factors for the purposes of any authority conditions which require the submission of a Review of Environmental Factors.

OR

☒

Non-Common Exploration Activity (minerals or coal authorities only)

Select one of the options below.

☐

Option 1: Complete all questions in this form to provide a Targeted Review of Environmental Factors.

☒

Option 2:

- Complete only **Questions 1–9** and **Questions 16–18** of this form
- Attach a Guideline Review of Environmental Factors prepared in accordance with [ESG2 Guideline for preparing a Review of Environmental Factors](#).

OR

☐

Petroleum Exploration Activity (petroleum authorities)

- Complete only **Questions 1–9** and **Questions 16–18**
- Attach a Guideline Review of Environmental Factors prepared in accordance with [ESG2 Guideline for preparing a Review of Environmental Factors](#).

8 Agricultural Impact Statement

Under the [NSW Strategic Regional Land Use Policy](#), certain Non-Common Exploration Activities must be accompanied by an Agricultural Impact Statement. When preparing an Agricultural Impact Statement, you should refer to the [Guideline for Agricultural Impact Statements at the Exploration Stage](#). An Agricultural Impact Statement may be included as part of a Guideline Review of Environmental Factors.

8.1 Non-Common Exploration Activity

Is your exploration activity regarded as a Non-Common Exploration Activity?

- ☒ Yes. ▶ Continue to **Question 8.2**
- ☐ No. An Agricultural Impact Statement is not required. ▶ **Go to Question 9**

8.2 Project area location

Is any part of the project area located on, or within, 2 km of [Strategic Agricultural Land](#) or directly on [Land and Soil Capability Classes 1, 2 or 3](#)?

- ☐ Yes. Attach an Agricultural Impact Statement. ▶ **Go to Question 9**
- ☒ No. Continue to **Question 8.3**

8.3 Entire project area

8.3.1 Indicate where the entire project area is located

The entire project area is located (check one or multiple boxes)

- ☒ A. Within a [State Forest](#), [Nature Reserve](#) or [State Conservation Area](#) or
- ☐ B. on existing residential, village, business or industrial zoned land under a [Local Environment Plan](#) (LEP), or
- ☐ C. within an existing [mining lease](#), or
- ☒ D. on [Land and Soil Capability Classes](#) 7 or 8
- ☒ E. and 500 metres or further inside the boundary of the areas listed above.



If you checked boxes A/B/C/D and E above, go to **Question 9**

If you did not check any of the boxes, continue to **Question 8.3.2**

8.3.2 Agricultural Impact Statement

If you did not check any of the boxes in **Question 8.3.1**, you will need to attach an Agricultural Impact Statement.

- ☐ I have attached an Agricultural Impact Statement. Enter any additional comments below.

9 Site plan and location details

Attach site plans and/or maps at an appropriate scale showing the following (as relevant):

- boundaries of the authority
- lot/DP numbers and boundaries
- topographic contours
- location of the proposed activity (including location of key features of the activity using MGA94 co-ordinates)
- layout of the proposed activity (using dimensions and alignments where appropriate)
- major regional features
- existing and proposed access tracks
- existing structures and infrastructure (including dimensions and alignments where relevant)
- nearby sensitive receptors (including residences, educational establishments, hospitals, places of worship, etc)
- location of Aboriginal and European heritage sites (including AHIMS search) (refer to **Question 10.11** and **10.10**, respectively)
- location of identified sensitive land (refer to **Question 12**)
- location of threatened species, populations or ecological communities, or their habitats (refer to **Question 13.4**).

Note: The site plans and/or maps required here can be included in a Guideline Review of Environmental Factors.

9.1 Identify the area

Identify the map sheet, block number/s and unit letter/s within which the activities are proposed. These details are referenced on your authority conditions.

Name of map sheet	Block number	Unit letter/s
Armidale	1100	d,e,j,k
Armidale	1101	a
Armidale	1028	z

9.2 Site plan/s and map/s

List the site plans and maps you have attached to this application, including relevant plan/map title, dates, reference numbers.

	Reference No.	Name/title	Date
1	Figure 1	Locality Plan	10/5/2016
2	Figure 2	Mineral Authorities, Regional Topography and Drainag	10/5/2016
3	Figure 3	Land Titles, Land Ownership and Surrounding Residences	10/5/2016
4	Figure 4	Seasonal Wind Roses – Tenterfield 3pm	10/5/2016
5	Figure 5	REF Area Topography and Drainage	10/5/2016

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

	Reference No.	Name/title	Date
6	Figure 6	Vegetation Communities and Threatened Species	10/5/2016
7	Figure 7	Proposed Activities	10/5/2016
8	Figure 8	Schematic Drill Site Layout	10/5/2016
9			
10			
Add additional references and notes here			

9.3 Photographs of all sites to be disturbed

Attach photographs of all sites to be disturbed. List all the photographs attached, including relevant photograph titles, site locations and dates. Include a plan illustrating where the photographs were taken from and their aspect.

	Photo number /reference	Photo name/description
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
See separate document with representative photographs as per email from Monique Meyer dated 21 March 2016.		

10 Site description and existing environment

For help answering this question, refer to Sections 1 and 2 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

10.1 Existing land uses

Provide details of existing land uses that may be affected by the proposed activity and any proposed changes (temporary or otherwise) to the current land use/s during the activity.

10.2 Sensitive receptor/s

Describe the location, type and distance to the nearest sensitive receptor/s (including residences, educational establishments, hospitals, places of worship).

10.3 Soil types and properties

Describe the soil types and properties (including susceptibility to compaction, erosion and dispersion; presence of acid sulfate soils and potential acid sulfate soils). Refer to [Strategic Agricultural Land Maps](#), [Land and Soil Capability Class Maps](#) and [Acid Sulfate Soils Maps](#).

10.4 Surface water sources

Provide details of the existing surface water sources in the area that are likely to be affected by the activity. Provide details of the nearest watercourse/s and the distance between the proposed disturbance area/s and the nearest watercourse/s.

10.5 Groundwater sources

Provide details of any existing groundwater sources that occur in the area that are likely to be affected by the activity.

10.6 Vegetation cover

Describe the vegetation cover type, density and condition.

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

10.7 Critical habitat

Provide details of any critical habitat that is likely to be affected by the activity including:

- areas declared as critical habitat under the *Threatened Species Conservation Act 1995* as listed in the [Critical Habitat Register](#) maintained by the Office of Environment and Heritage.
- areas declared as critical habitat under the *Fisheries Management Act 1994* as recorded in the Department of Primary Industries [register of critical habitat](#).

10.8 Threatened species records search (wildlife and vegetation)

Attach copies of any relevant threatened species records kept by the Office of Environment and Heritage according to the *Threatened Species Conservation Act 1995*. Refer to www.environment.nsw.gov.au or www.bionet.nsw.gov.au for this information. Ensure searches are relevant to the proposed disturbance areas.

- ☐ A copy of the Atlas NSW Wildlife Search is attached (refer to [NSW BioNet](#))
- ☐ A copy of Atlas' Vegetation Information System is attached (refer to [NSW BioNet](#))

10.9 Aquatic habitat species record search

Attach copies of any relevant [threatened and protected species records for aquatic habitats](#) kept by the Department of Primary Industries according to the *Fisheries Management Act 1994*.

- ☐ A copy of the threatened and protected species records for aquatic habitats search is attached.

10.10 Historic cultural or natural heritage items

10.10.1 Record searches

Attach copies of record searches for any historic cultural or natural heritage items that may be impacted by the activity. As a minimum, identify if any of the following are impacted. For any of the items below, only attach copies of relevant heritage searches.

- ☐ Items listed on the [World Heritage List](#)
- ☐ Items listed on the [Commonwealth Heritage List](#)
- ☐ Items listed on the [National Heritage List](#)
- ☐ [State Heritage Register](#)
- ☐ Items listed in the heritage schedule of an [environmental planning instrument](#), such as a local council's Local Environment Plan

10.10.2 Describe any items of historic cultural or natural heritage that may be impacted by the activity.

NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

10.11 Aboriginal heritage sites

10.11.1 Describe the nearest Aboriginal sites or any sites that may be affected.

Describe the location, type and distance to the nearest Aboriginal heritage sites and any impact the proposed activity will have on Aboriginal heritage sites (Aboriginal objects and places).

10.11.2 AHIMS search

For exploration activities, the [National Parks and Wildlife Act 1974](#) requires you to exercise due diligence to check if Aboriginal sites will be harmed.

The Office of Environment and Heritage maintains the [Aboriginal Heritage Information Management System](#) (AHIMS) which you can use to undertake due diligence. The AHIMS includes:

- information about Aboriginal objects that have been reported to the Director General, Department of Premier and Cabinet
- information about Aboriginal Places which have been declared by the Minister for the Environment to have special significance with respect to Aboriginal culture
- archaeological reports.

Attach your [AHIMS](#) search to support that you have undertaken due diligence for this application.

☐ I have attached a copy of the AHIMS search.

11 Description of the exploration activity

For guidance answering this question, refer to Section 3 [ESG2 Guideline for preparing a Review of Environmental Factors](#).

11.1 Stages of the activity

Describe all stages of the activity, including before, during and after exploration, including decommissioning.

11.2 Exploration methods

Describe the exploration methods, including machinery and equipment to be used (including what equipment will be operating at any one time).

11.3 Total surface disturbance

Provide the total surface disturbance (in square metres/hectares) for the proposed exploration program.

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

11.4 Earthworks or vegetation clearing

Detail any earthworks or vegetation clearing, including the re-use and disposal of cleared material (including use of spoil-on-site).

11.5 Timing and phasing of the activity

Describe the timing and any phasing of the activity (including anticipated commencement dates and anticipated completion dates for all activities).

11.6 Proposed sealing/suspension of drill holes/wells

Describe the proposed sealing/suspension of drill holes/wells, including details of any well head suspension, security, maintenance and monitoring programs.

11.7 Venting, flaring or re-use of gases

Describe any proposed venting, flaring or re-use of gases, including details of the system design and venting/flaring/re-use processes.

11.8 Access to exploration activities

Describe the means of access to the various exploration activities. Describe any upgrading of existing access tracks and any construction of new access tracks.

11.9 Ancillary activities

Provide details of any activities which are ancillary to the proposed exploration activities including requirements for water storage, ancillary infrastructure, temporary accommodation.

Note: Certain ancillary works and activities (such as accommodation camps and environmental assessment activities) do not constitute an 'exploration' or 'prospecting' activity under the Mining Act 1992 or the Petroleum (Onshore) Act 1991 and therefore cannot be approved by the department. The authority holder should obtain their own advice, and/or make their own enquiries with the relevant local council, Crown Lands controlling authority or the landholder regarding separate consent or approvals required under the Environmental Planning and Assessment Act 1979 and/or Local Government Act 1993.

NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

11.10 Proposed hours of operation

Provide details of the proposed hours of operation.

11.11 On-site employee or contractor numbers

Provide an estimate of on-site employee or contractor numbers.

11.12 Surface water management

Describe how surface water will be managed (including water sources, water usage, water storage and water disposal/reuse).

Note: for guidance answering this question, refer to Section 3.5 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

11.13 Groundwater management

Describe how groundwater will be managed (including water produced, stored and disposed of/reused during exploration).

Note: for guidance answering this question, refer to Section 3.5 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

11.14 Waste and excess material management

Describe the type, quantities and management of any [waste](#) and excess materials (including drill cuttings, waste water, solid wastes, radioactive material, hazardous wastes, restricted wastes or special wastes).

Note: for guidance refer to Section 3.5 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

11.15 Chemical management

Detail the handling, use, storage and transportation of any chemicals and hydrocarbons.

Note: for guidance refer to Section 3.5 of [ESG2: Guideline for preparing a Review of Environmental Factors](#).

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

11.16 Noise management

Describe how noise will be managed to minimise impacts on any nearby sensitive receivers.

Note: for guidance refer to Section 3.5 of [ESG2: Guideline for preparing a Review of Environmental Factors](#).

11.17 Air quality management

Describe how air quality will be managed, including measures to minimise impacts resulting from any dust generation, venting, flaring and fugitive emissions.

Note: for guidance refer to Section 3.5 of [ESG2: Guideline for preparing a Review of Environmental Factors](#).

12 Sensitivity of land to be disturbed

Advise whether the activity will occur on any of the types of land listed below. All sections must be completed. Explanatory notes are provided in Section 7.1 of [ESG5: Assessment Requirements for Exploration Activities](#) to assist authority holders in identifying land to which these location restrictions apply.

An activity can only be assessed under the Common Exploration Activity assessment pathway if all boxes have been ticked as 'No'. Some of these areas are also 'exempted areas' under the *Mining Act 1992* and *Petroleum (Onshore) Act 1991* (refer to **Question 4**).

If you answer 'yes' to any of the questions below, provide an assessment of impacts by completing **Question 15**.

12.1 Conservation areas

Land	Yes	No
Land reserved under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land acquired by the Minister for the Environment under Part 11 of the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land subject to a 'conservation agreement' under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared as an aquatic reserve under the <i>Marine Estate Management Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared as a marine park under the <i>Marine Estate Management Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land within State Forests set aside under the <i>Forestry Act 2012</i> for conservation values, including Flora Reserves or Special Management (and other) Zones	<input type="checkbox"/>	<input type="checkbox"/>
Land reserved or dedicated under the <i>Crown Lands Act 1989</i> for the preservation of flora, fauna, geological formations or other environmental protection purposes	<input type="checkbox"/>	<input type="checkbox"/>
Land identified as wilderness or declared a wilderness area under the <i>Wilderness Act</i>	<input type="checkbox"/>	<input type="checkbox"/>

NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

Land	Yes	No
1987	<input type="checkbox"/>	<input type="checkbox"/>
Land subject to a biobanking agreement under the <i>Threatened Species Conservation Act 1995</i>	<input type="checkbox"/>	<input type="checkbox"/>

12.2 Drinking water catchment protection areas

Land	Yes	No
Land declared to be a 'controlled area' or a 'special area' under the <i>Water NSW Act 2014</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land declared to be a 'special area' under the <i>Water Management Act 2000</i> or <i>Hunter Water Act 1991</i>	<input type="checkbox"/>	<input type="checkbox"/>

12.3 Sensitive areas

Note: The upgrade or use of existing access tracks on waterfront land can still be assessed as a Common Exploration Activity, refer to Sections 7.1 and 7.2 of [ESG5 Assessment Requirements for Exploration Activities](#).

Land	Yes	No
Land declared as critical habitat under the <i>Threatened Species Conservation Act 1995</i> or Part 7A of the <i>Fisheries Management Act 1994</i>	<input type="checkbox"/>	<input type="checkbox"/>
Wetlands of international significance listed under the Ramsar Wetlands Convention	<input type="checkbox"/>	<input type="checkbox"/>
Land designated as a nationally important wetland in the Directory of Important Wetlands	<input type="checkbox"/>	<input type="checkbox"/>
Land mapped under <i>State Environmental Planning Policy No. 14 – Coastal Wetlands</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land mapped under <i>State Environmental Planning Policy No. 26 – Littoral Rainforests</i>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal waters of the State as defined in the <i>Coastal Protection Act 1979</i> and the <i>Coastal Protection Regulations 2011</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land identified in an environmental planning instrument as being of biodiversity significance or zoned for environmental conservation	<input type="checkbox"/>	<input type="checkbox"/>
Waterfront land defined under the <i>Water Management Act 2000</i> *	<input type="checkbox"/>	<input type="checkbox"/>
Land with a slope greater than 18 degrees measured from the horizontal	<input type="checkbox"/>	<input type="checkbox"/>

12.4 Land with potential for soil and water contamination

Land	Yes	No
Land mapped as Actual Acid Sulfate Soils (AASS) or Potential Acid Sulfate Soils (PASS) on the Acid Sulfate Soils Risk Maps for NSW	<input type="checkbox"/>	<input type="checkbox"/>

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

12.5 Heritage protection areas (Aboriginal and European)

Land	Yes	No
Land declared as an Aboriginal place under the <i>National Parks and Wildlife Act 1974</i>	<input type="checkbox"/>	<input type="checkbox"/>
Land listed on the World Heritage List, National Heritage List or Commonwealth Heritage List	<input type="checkbox"/>	<input type="checkbox"/>
Land, places, buildings or structures listed on the NSW State Heritage Register	<input type="checkbox"/>	<input type="checkbox"/>
Land identified in an environmental planning instrument (such as a State Environmental Planning Policy, Regional Environment Plan or Local Environment Plan) as being of Aboriginal or European heritage significance	<input type="checkbox"/>	<input type="checkbox"/>

12.6 Critical Industry Clusters

Land	Yes	No
Land identified as Critical Industry Cluster under <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>	<input type="checkbox"/>	<input type="checkbox"/>

12.7 Community land

Land	Yes	No
Public land classified as community land under the <i>Local Government Act 1993</i>	<input type="checkbox"/>	<input type="checkbox"/>

12.8 Other areas

Land	Yes	No
Land identified on the authority as environmentally sensitive land	<input type="checkbox"/>	<input type="checkbox"/>

13 Impact thresholds and criteria

Provide details relating to the impact thresholds and criteria outlined below. These include cumulative impact thresholds from existing approved activities that have not yet been undertaken/rehabilitated to the satisfaction of the department. Explanatory notes are provided in Section 7.2 of [ESG5 Assessment Requirements for Exploration Activities](#) to assist authority holders in completing these details.

Note: An activity can only be assessed under the Common Exploration Activity assessment pathway if all boxes have been ticked as 'no' and none of the impact thresholds and criteria have been exceeded. A previously approved/undertaken activity must be counted unless the department has acknowledged in writing that the area has been satisfactorily rehabilitated.

All questions, tick boxes and values must be completed - even if the value is zero.

13.1 Vegetation clearing

13.1.1 Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 1,000 square metres in any single hectare?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Clearing proposed	<input type="text"/>	m ²
Clearing previously approved/undertaken	<input type="text"/>	m ²
Total Clearing (existing and proposed)	<input type="text"/>	m ²

13.1.2 Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 1 hectare in any single unit of the authority (or every 250 hectares in the case of authorities which do not align to unit boundaries)?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Clearing proposed	<input type="text"/>	ha
Clearing previously approved/undertaken	<input type="text"/>	ha
Total Clearing (existing and proposed)	<input type="text"/>	ha

13.1.3 Will cumulative vegetation clearing and/or removal of tree canopy exceed more than 5 hectares in any single authority?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Clearing proposed	<input type="text"/>	ha
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NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

Clearing previously approved/undertaken	<input type="text"/>	ha
Total Clearing (existing and proposed)	<input type="text"/>	ha

13.2 Surface disturbance and excavations

13.2.1 Will cumulative surface disturbances exceed a total of 1 hectare within any single unit of an authority (or every 250 hectares in the case of authorities which do not align to unit boundaries)?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Disturbance proposed	<input type="text"/>	ha
Disturbance previously approved/undertaken	<input type="text"/>	ha
Total disturbance (existing and proposed)	<input type="text"/>	ha

13.2.2 Will cumulative surface disturbance exceed a total of 5 hectares within any single authority?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Disturbance proposed	<input type="text"/>	ha
Disturbance previously approved/undertaken	<input type="text"/>	ha
Total disturbance (existing and proposed)	<input type="text"/>	ha

13.2.3 Will cumulative excavations exceed 200 cubic metres within any single unit of an authority (or every 250 hectares in the case of authorities which do not align to unit boundaries)?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Excavations proposed	<input type="text"/>	m ³
Excavations previously approved/undertaken	<input type="text"/>	m ³
Total excavations (existing and proposed)	<input type="text"/>	m ³

13.2.4 Will cumulative excavations exceed 1,000 cubic metres within any single authority?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Excavations proposed	<input type="text"/>	m ³
Excavations previously approved/undertaken	<input type="text"/>	m ³
Total excavations (existing and proposed)	<input type="text"/>	m ³

13.3 Extraction of groundwater (produced water)

13.3.1 Will cumulative extraction of groundwater from all exploration activities within the authority exceed 3 megalitres (ML) per year?

- ☐ Yes. Provide assessment of impacts by completing **Question 15**.
- ☐ No

Extraction proposed	<input type="text"/>	ML per year
Extraction previously approved/undertaken	<input type="text"/>	ML per year
Total extraction (existing and proposed)	<input type="text"/>	ML per year

13.4 Ecology

13.4.1 Will the activity have a significant effect on threatened species or their habitats?

- ☐ No. Continue to **Question 13.4.2**
- ☐ Yes. Provide assessment impacts by completing **Question 15** and any relevant details below (and attach copies as relevant) of any supporting documentation e.g. 7-part test of significance undertaken in accordance with the criteria set out in [Section 5A](#) of the *Environmental Planning and Assessment Act 1979*.

13.4.2 Will the activity have a significant effect on threatened populations or their habitats?

- ☐ No. Continue to **Question 13.4.3**
- ☐ Yes. Provide assessment impacts by completing **Question 15** and any relevant details below (and attach copies as relevant) of any supporting documentation e.g. 7-part test of significance undertaken in accordance with the criteria set out in [Section 5A](#) of the *Environmental Planning and Assessment Act 1979*.

13.4.3 Will the activity have a significant effect on threatened ecological communities or their habitats?

- ☐ No. Continue to **Question 13.4.4**

NSW Department of Industry, Division of Resources and Energy

ESF4 Application to conduct exploration activities

- ☐ Yes. Provide assessment impacts by completing **Question 15** and any relevant details below (and attach copies as relevant) of any supporting documentation e.g. 7-part test of significance undertaken in accordance with the criteria set out in [Section 5A](#) of the *Environmental Planning and Assessment Act 1979*.

13.4.4 Will vegetation be removed as part of access track upgrade works in waterfront land?

- ☐ No. Go to **Question 13.5**
- ☐ Yes. Provide assessment impacts by completing **Question 15** and relevant details of vegetation removal.

13.5 Aboriginal heritage

13.5.1 Will the activity harm Aboriginal objects?

- ☐ No. Go to **Question 13.6**
- ☐ Yes. Provide assessment impacts by completing **Question 15** and any relevant details below (and attach copies as relevant) of any supporting documentation (e.g. any Aboriginal archaeological due diligence assessments undertaken in accordance with the [NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects](#) (NSW Minerals Council Ltd, 2010).

13.6 European heritage

13.6.1 Will the activity damage heritage items?

- ☐ No. Go to **Question 14**
- ☐ Yes. Provide assessment impacts by completing **Question 15** and any relevant details below (and attach copies as relevant) of any supporting documentation.

14 Compliance with Exploration Codes of Practice

[Exploration Codes of Practice](#) have been prepared by the department. The Codes of Practice only apply to prospecting authorities granted, renewed or transferred in respect of applications received after 1 July 2015. Exploration activities undertaken pursuant to these titles must comply with the relevant Exploration Codes of Practice to be assessed under the Common Exploration Activity pathway.

The Codes of Practice provide authority holders with information about the minimum performance requirements to ensure that exploration is undertaken to manage and minimise risks to the environment.

14.1 Does the authority include references to Category 1, Category 2 and Category 3 prospecting operations?

- ☐ Yes. Go to **Question 16**. (*Note: Compliance with the Exploration Codes of Practice is not required as the existing conditions of the authority will apply as the management controls*).
- ☐ No. Complete **Question 14.2**, to confirm that the proposed prospecting operations will comply with the relevant Exploration Codes of Practice.

14.2 Compliance requirements

Check the boxes to indicate that the proposed prospecting operations will comply with the relevant code.

<input type="checkbox"/>	Environmental management Yes, the activity will be undertaken in accordance with the Exploration Code of Practice: Environmental Management .
<input type="checkbox"/>	Rehabilitation Yes, the activity will be undertaken in accordance with the Exploration Code of Practice: Rehabilitation .
<input type="checkbox"/>	Produced water management, storage and transfer
<input type="checkbox"/>	Yes, the activity will be undertaken in accordance with the Exploration Code of Practice: Produced Water Management, Storage and Transfer . [For prospecting operations where produced water will need to be managed and a produced water storage management facility is required (in addition to any ancillary drilling sumps and tanks)].
<input type="checkbox"/>	Not applicable.

14.3 Further details

Provide any further details relating to the above management controls and Codes of Practice as required.

15 Review of Environmental Factors for Non-Common Exploration Activities

Where an activity will **not** meet the Common Exploration Activities Location Restrictions outlined in **Question 12** and/or the Common Exploration Activities Impact Thresholds and Criteria outlined in **Question 13**, the authority holder must select one of the following options:

☐

Option A: Complete **Question 15** below to provide a Targeted Review of Environmental Factors (REF). This information only needs to specify the potential environmental impacts associated with the departure(s) from the relevant Common Exploration Activities location restriction, impact threshold/criteria or management control. This would generally be appropriate for activities that do not significantly depart from the Common Exploration Activities criteria.

OR

☐

Option B: Attach a Guideline Review of Environmental Factors prepared in accordance with [ESG2 Guideline for preparing a Review of Environmental Factors](#). This would generally be appropriate for activities which significantly depart from the Common Exploration Activities criteria, but are not likely to have a significant impact on the environment. Note: *Petroleum Exploration Activities are required to lodge a Guideline Review of Environmental Factors (refer to **Question 7** of this form). You do not need to complete the rest of question 15 below if you choose this option.* Check the box to indicate you have attached the Guideline REF to this application.

☐ I have attached a Guideline Review of Environmental Factors.

15.1 Physical and pollution impacts

For guidance refer to Section 4.1 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

15.1.1 Air impacts

Is the activity likely to impact on air quality? Consider air quality impacts:

- such as dust, smoke, odours, fumes, fugitive emissions, toxic or radioactive gaseous emissions with economic, health, ecosystem or amenity considerations
- through generation of greenhouse gas emissions or release of chemicals
- on nearby sensitive receptors.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.2 Water impacts

Is the activity likely to impact on water quality and/or water quantity? Consider impacts from:

- the use of surface or groundwater
- the storage of water
- changes to natural waterbodies, wetlands or runoff patterns
- aquifer interference including changes to inter-aquifer connectivity
- changes to flooding or tidal regimes
- changes in surface and groundwater quality and quantity

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.3 Soil and stability impacts

Is the activity likely to impact on soil quality or land stability? Consider any:

- degradation of soil quality including contamination, salinisation or acidification
- loss of soil from wind or water erosion
- increased land instability with high risks from land slides or subsidence

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.4 Noise and vibration impacts

Is the activity likely to have noise or vibration impacts on nearby sensitive receptors?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.5 Coastal processes and hazards

Is the activity likely to affect coastal processes and hazards including those under projected climate change conditions?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.6 Hazardous substances and chemicals

Is the activity likely to result in impacts associated with the use, generation, storage or transport of hazardous substances or chemicals?

Consider any:

- use, storage or transport of hazardous substances
- use or generation of chemicals which may build up residues in the environment

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

- chemicals or radioactive material that will be reacted, returned to the surface or left in a drill hole or target formation.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.1.7 Wastes and emissions

Is the activity likely to result in any impacts to the environment resulting from the generation or disposal of gaseous, liquid or solid wastes or emissions?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2 Biological impacts

For guidance refer to Section 4.2 of [ESG2: Guideline for preparing a Review of Environmental Factors](#).

Fauna and flora (including impact on Threatened Species, Populations or Ecological Communities or their Habitats – for the purposes of [Section 5A](#) of the Environmental Planning and Assessment Act 1979, and in the administration of Sections 111 and 112, the matters below must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats.

This assessment of significance must be undertaken pursuant to the assessment guidelines issued and in force under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994. This assessment of the significance is the first step in considering potential impacts. When a significant effect is likely, a Species Impact Statement (SIS) prepared in accordance with the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994 may be required.

15.2.1 Vegetation

Is any vegetation to be cleared or modified (including vegetation of conservation significance)?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.2 Threatened species

Is the activity likely to have an adverse effect on the life-cycle of a threatened species such that a viable local population of the species is likely to be placed at risk of extinction?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.3 Endangered populations

Is the activity likely to have an adverse effect on the life-cycle of a species that constitutes an endangered population such that a viable local population of the species is likely to be placed at risk of extinction?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.4 Critical habitat

Is the activity likely to have an adverse effect on critical habitat (either directly or indirectly)? (Refer to Question 10.7)

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.5 Endangered ecological community or critically endangered ecological community

Select as relevant:

- ☐ The activity is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
- ☐ The activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.6 Habitat of a threatened species, population or ecological community

Select as relevant:

- ☐
 The extent to which the habitat is likely to be removed or modified as a result of the activity will be significant.
- ☐
 The area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the activity.
- ☐
 The habitat to be removed, modified, fragmented or isolated is important to the long-term survival of the species, population or ecological community in the locality.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.7 Recovery plan or threat abatement plan

Is the activity consistent with the objectives or actions of any relevant plan?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.8 Key threatening process

Will the activity constitute or form part of a [key threatening process](#) or is likely to result in the operation of, or increase the impact of, a key threatening process?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.9 Barriers to movement

Does the activity have the potential to endanger, displace or disturb fauna or create a barrier to their movement?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.2.10 Ecological and biosecurity impacts

Select as relevant:

- ☐ The activity is likely to cause a threat to the biological diversity or ecological integrity of an ecological community.
- ☐ The activity is likely to create a biosecurity risk or introduce modified organisms into an area.
- ☐ The activity is likely to cause a bushfire risk.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.3 Resource use impacts

For guidance refer to Section 4.3 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

15.3.1 Community resources

Is the activity likely to degrade or significantly increase the demand for services and infrastructure resources?

Note: Infrastructure includes roads, power, water, drainage, waste management, educational, medical or social services.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

Is the activity likely to require any significant resource recycling or reuse schemes to reduce resource usage?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any diversion of resources to the detriment of other communities or natural systems?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.3.2 Natural resources

Is the activity likely to disrupt, deplete or destroy natural resources?

Note: Natural resources include land and soil, water, air and minerals.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to disrupt existing activities (or reduce options for future activities)?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in the degradation of any area reserved for conservation purposes?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4 Community impacts

For guidance refer to Section 4.4 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

15.4.1 Social impacts

Is the activity likely to result in a change to the demographic structure of the community, including changes to workforce or industry structure of the area/region?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to have an environmental impact that may cause substantial change or disruption to the community, including loss of facilities, reduced links to other communities or loss of community identity?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in some individuals or communities being significantly disadvantaged?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any impacts on the health, safety, privacy or welfare of individuals or communities because of factors such as air pollution, odour, noise, vibration and lighting?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in a change in the level of demand for community resources, including community facilities, community services and labour force?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.2 Economic impacts

Is the activity likely to have significant economic impacts? Consider any impacts that may:

- affect economic activity (positive or negative), particularly impacts which result in a decrease to net economic welfare
- result in a decrease in the economic stability of the community
- result in a change to the public sector revenue or expenditure base.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.3 Heritage impacts

Is the activity likely to cause impacts on localities, places, landscapes, buildings or archaeological relics of heritage significance?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.4 Aesthetic impacts

Is the activity likely to cause impacts on the visual or scenic landscape, including any venting or flaring of gas?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.5 Cultural impacts

Will the activity disturb the ground surface or any culturally modified trees?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Will the activity affect known Aboriginal objects or Aboriginal places?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity located in areas where landscape features indicate the presence of Aboriginal objects?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Can harm to Aboriginal objects or disturbance of landscape features be avoided?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Will the activity affect areas subject to native title claims, indigenous land use agreements or joint management agreement?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.6 Land use impacts

Is the activity likely to result in major changes to land use, including any curtailment of other beneficial land uses?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

Is the activity likely to result in any significant property value impacts with land use implications?

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.4.7 Transportation impacts

Is the activity likely to result in any significant impacts on transportation? Consider any:

- substantial impacts on existing transportation systems (such as road, rail, pedestrian) which alter present patterns of circulation or movement
- impacts associated with direct or indirect additional traffic.

Impact level	Detail of impacts	Outline any management controls/mitigation measures
Select level...		

15.5 Matters of National Environmental Significance

For guidance refer to Section 4.5 of [ESG2 Guideline for preparing a Review of Environmental Factors](#).

Is the activity likely to impact on any of the following matters of National Environmental Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*? Select as relevant:

- ☐ Listed threatened species and communities
- ☐ Listed migratory species
- ☐ Ramsar wetlands of international importance
- ☐ Commonwealth marine environment
- ☐ World heritage properties
- ☐ National heritage places
- ☐ Great Barrier Reef Marine Park
- ☐ Nuclear actions
- ☐ A water resource, in relation to coal seam gas development and large coal mining development

16 Rehabilitation Cost Estimate

All authority holders are required to lodge a security deposit with the department to cover the Government's full costs in undertaking rehabilitation in the event of default by the authority holder. A Rehabilitation Cost Estimate must be submitted with all applications. The Rehabilitation Cost Estimate is used by the department to help determine the amount of the security. Refer to [ESG1 Rehabilitation Cost Estimate Guidelines](#) and [ESB26 Schedule of Rehabilitation Costs](#) for more information.

The scope of the Rehabilitation Cost Estimate must include the cost of fulfilling any rehabilitation liabilities or other obligations associated with on-going previously approved exploration activities on the authority, as well as proposed exploration activities subject to this application.

16.1 Have you already lodged an RCE related to this application?

<input type="checkbox"/>	<p>Yes. Provide the Rehabilitation Cost Estimate lodgement date and further details in text box below and go to Question 17.</p> <div style="border: 1px solid black; height: 20px; width: 600px; margin-top: 10px;"></div>					
<input checked="" type="checkbox"/>	<p>No. Attach a Rehabilitation Cost Estimate which evidences how the estimate is derived and complete the fields below.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Select one of the options below to confirm the methodology</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Department's Rehabilitation Cost Schedule</td> <td style="width: 50px; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 50px;"></td> <td style="width: 50%;">Other</td> <td style="width: 50px; text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Current security held by the department</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">\$20,000</div> <p>Total of this Rehabilitation Cost Estimate</p> <div style="border: 1px solid black; padding: 2px;">\$19,635</div> </div>	Department's Rehabilitation Cost Schedule	<input checked="" type="checkbox"/>		Other	<input type="checkbox"/>
Department's Rehabilitation Cost Schedule	<input checked="" type="checkbox"/>		Other	<input type="checkbox"/>		

17 Checklist of items to be included with this application

Item		Reference
Minister's consent to prospect in exempted areas (if applicable)	<input checked="" type="checkbox"/>	Question 4
Minister's consent to prospect in a State Conservation Area (if applicable)	<input type="checkbox"/>	Question 5
A Guideline Review of Environmental Factors	<input checked="" type="checkbox"/>	Question 7 and Question 15
Agricultural Impact Statement	<input type="checkbox"/>	Question 8
Site plan/maps showing location of activities and proposed site layout	<input checked="" type="checkbox"/>	Question 9
Site photographs of the site/s prior to disturbance	<input checked="" type="checkbox"/>	Question 9
Copy of the Atlas's Vegetation Information System search	<input type="checkbox"/>	Question 10.8
Copy of the Atlas NSW Wildlife search	<input type="checkbox"/>	Question 10.8
Threatened species assessment of significance	<input type="checkbox"/>	Question 10.8 and Question 13.4
Copy of threatened and protected species records for aquatic habitats	<input type="checkbox"/>	Question 10.9
Heritage database search	<input type="checkbox"/>	Question 10.10 and Question 13.6
AHIMS search	<input type="checkbox"/>	Question 10.11
Aboriginal heritage due diligence assessment	<input type="checkbox"/>	Questions 10.11 and Question 13.5
Rehabilitation Cost Estimate	<input checked="" type="checkbox"/>	Question 16
For agents only – evidence of appointment as agent by the authority holder/s	<input type="checkbox"/>	Question 18

17.1 Have you lodged all the required information with this form?

- ☒ Yes
- ☐ No. I will provide outstanding information within 10 business days of lodging this application. **Note:** processing of your application will not commence until all information is received and is considered administratively complete.


Describe the additional information to be provided.

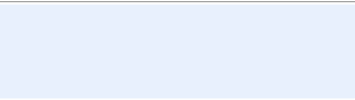
18 Declaration

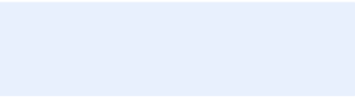
This form should be signed by the authority holder/s or an authorised representative.

I/We certify that the information provided in this application is true and correct. I/We understand that under [Part 5A](#) of the *Crimes Act 1900*, knowingly giving false or misleading information is a serious offence; and under [Section 378C](#) of the *Mining Act 1992*, any person who provides information that the person knows to be false or misleading is guilty of an offence, for which they may be subject to prosecution.

Declaration by authority holder/s

Authority Holder Name	Dr Leon Pretorius
Position/title	Executive Chairman
Date	24 May 2016
Signature	

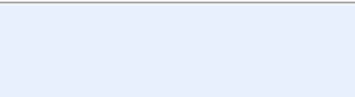
Authority Holder Name	
Position/title	
Date	
Signature	

Authority Holder Name	
Position/title	
Date	
Signature	

OR

Declaration by agent authorised to act for this authority holder

Provide evidence of appointment by the authority holder.

Name	
Position/title	
Date	
Signature	

NSW Department of Industry, Division of Resources and Energy
ESF4 Application to conduct exploration activities

Office use only

Application received:

Time:

Date:

Received under delegation from the Secretary

Name

Signature

Document control

Authorised by: Executive Director, Compliance and Enforcement

RM8 Reference: PUB16/112 INT16/17754 (V15/5289#12)

Amendment schedule

Date	Version #	Amendment
01 March 2016	2.0	New template
06 March 2016	2.1	Hyperlinks updated, minor edits
2 May 2016	2.2	Minor edits Q1 4.1 and Q17.1



Department
of Industry
Resources & Energy

Reference: T13-1177#3
T14-1026#3

Torrington Minerals Pty Ltd
C/- Mr Bob Harrison
Mining Title Services Pty Ltd
9 Kinsellas Drive
Lane Cove North NSW 2066

Dear Mr Harrison

EXPLORATION LICENCE NOs 8258 & 8355

I refer to your request for Minister's consent to carry out prospecting operations within Torrington State Forest.

In accordance with the provisions of Section 30 of the *Mining Act 1992*, the Minister has consented to operations being conducted at the location/s as shown on Plan REF Areas Torrington EL 8258 & EL 8355, attached to your letter dated 27 August 2015.

The consent is subject to the conditions of the licence and the conditions of the Forestry Permit between Forestry Corporation New South Wales and Torrington Minerals Pty Ltd & Tootung Ltd (Guarantor) dated 7 April 2016.

The attached endorsement schedule should be placed with the original title documents.

For further information, please contact the undersigned on (02) 4931 6424.

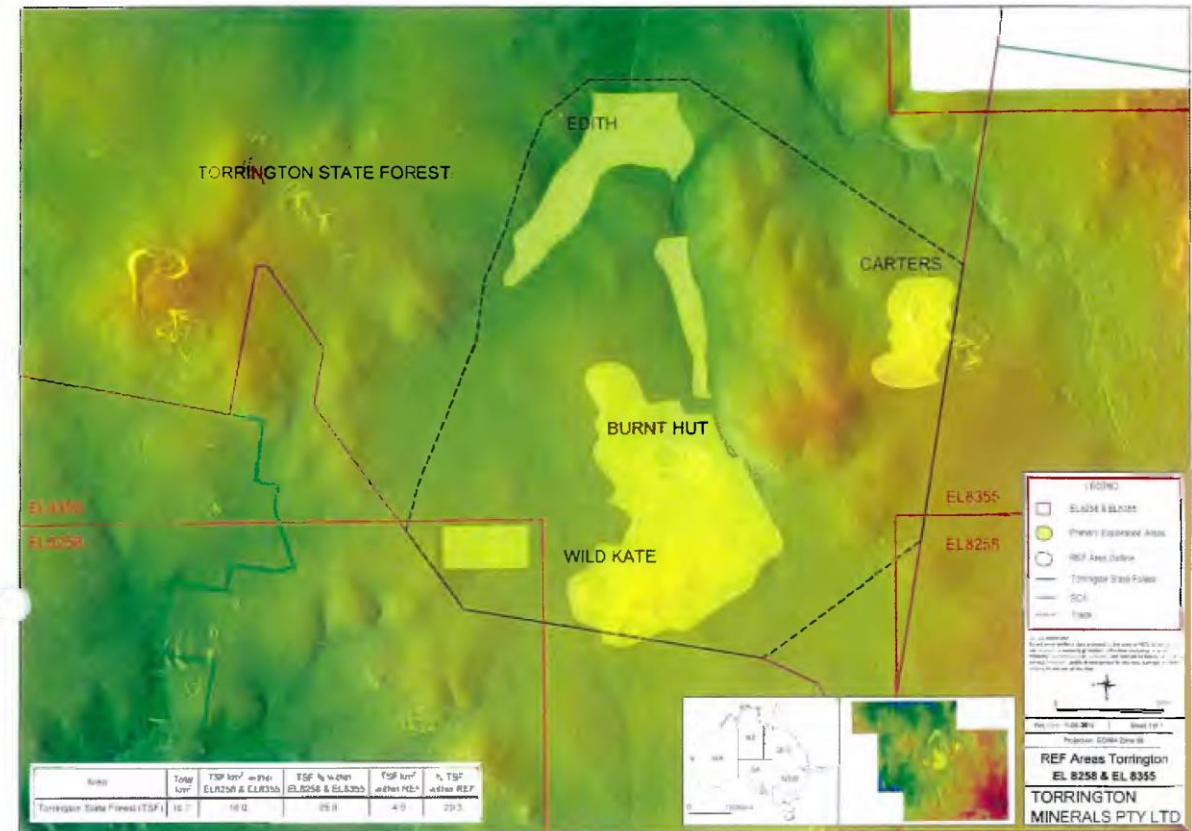
Yours faithfully

A handwritten signature in black ink, appearing to read 'J. Hoffman'.

Jedda Hoffman
for Secretary
21 April 2016

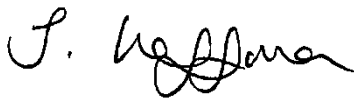
11/23/2015

15-Complete REF MAP TSF 17-8.jpg



ENDORSEMENT SCHEDULE

In accordance with Section 30 of the *Mining Act 1992* the Minister on 19 April 2016 consented to the holder of Exploration Licence Nos 8258 & 8355 exercising the rights conferred by the Act and the licence within Torrington State Forest, subject to the conditions of the licence and the conditions set out in the Forest Permit between Forestry Corporation New South Wales and Torrington Minerals Pty Ltd and Toptung Ltd dated 7 April 2016.



Jedda Hoffman

Titles

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**Photo 1 Potential Processing
Area – West
(Source: Torrington Minerals
P1030286)**



**Photo 2 Potential Processing Area
– Central (Source:
Torrington Minerals
P1030289)**

**Photo 3 Potential Processing
Area – East
(Source: Torrington Minerals
P1030291)**



Photo 4 Existing Access Track
within Wild
Kate Resource
Identification Area
(Photo E925A_031)



Photo 5 Existing Vegetation with
Wild Kate Resource Area
(Photo E925A_032)

Photo 6 Existing Vegetation with
Wild Kate Resource Area
(Photo E925A_037)



Photo 7 Existing Vegetation
with Wild Kate
Resource Area
(Photo E925A_038)



Photo 8 View East Within Previous
Workings within Burnt
Hut Resource
Identification Area
(Photo E925A_014)

Photo 9 View North Within
Previous Workings within
Burnt Hut Resource
Identification Area
(Photo E925A_015)



**Photo 10 View Northwest Within
Previous Workings within
Burnt Hut Resource
Identification Area
(Photo E925A_018)**



**Photo 11 View North Between
Previous Workings within
Burnt Hut Resource
Identification Area
(Photo E925A_022)**

**Photo 12 View West Along Existing
Access Track within
Burnt Hut Resource
Identification Area
(Photo E925A_026)**



**Photo 13 View East Along
Existing Access Track within Burnt
Hut Resource Identification Area
(Photo E925A_027)**



**Photo 14 View South Along
Existing Access Track
within Burnt Hut
Resource Identification Area
(Photo E925A_028)**

**Photo 15 Previous Workings within
Mt Everard Resource
Identification Area
(Photo E925A_044)**



Photo 16 **Vegetation South of
Previous Workings within Mt
Everard Resource Identification
Area (Photo E925A_047)**



Plate 17 **Vegetation South of
Previous Workings within Mt
Everard Resource Identification
Area (Photo E925A_048)**

Photo 18 **Vegetation North of
Previous Workings within
Mt Everard Resource
Identification Area
(Photo E925A_053)**



Photo 19 Vegetation within
northern part of
Mt Everard Resource
Identification Area
(Photo E925A_057)



Photo 20 View West-Northwest
Along Transmission
Line Easement through
Mt Everard Resource
Identification Area
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Appendix 2

Ecological Assessment

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Ecology Assessment

Torrington Tungsten & Topaz Project



**Prepared for R.W. Corkery & Co. Pty. Ltd on behalf of Torrington
Minerals Pty. Ltd.**

MAY 2016

Report No. 16.EcIA-026

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Ecology Assessment

Torrington Tungsten & Topaz Project

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Table of Contents

EXECUTIVE SUMMARY.....	VI
1 INTRODUCTION.....	1
1.1 STUDY AREA.....	1
1.2 SCOPE AND OBJECTIVES	1
1.3 PROJECT DESCRIPTION	2
1.4 DEFINITIONS AND ACRONYMS.....	2
1.5 QUALIFICATIONS AND EXPERIENCE OF PERSONNEL	3
2 LEGISLATIVE CONTEXT.....	5
2.1 THREATENED SPECIES CONSERVATION ACT 1995	5
2.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999	5
2.3 FISHERIES MANAGEMENT ACT 1994	6
2.4 STATE ENVIRONMENTAL PLANNING POLICY NO. 44.....	6
2.5 ECOLOGICAL SUSTAINABLE DEVELOPMENT	6
3 REGIONAL CONTEXT	8
3.1 REGIONAL SCALE	8
3.1.1 <i>Interim Bioregionalisation of Australia</i>	8
3.1.2 <i>Vegetation and Flora</i>	8
3.1.3 <i>Fauna</i>	8
3.1.4 <i>Conservation Reserves</i>	8
3.2 DISTRICT SCALE	9
3.2.1 <i>District Habitat Features</i>	9
3.2.1.1 <i>Watercourses and Wetlands</i>	9
3.2.1.2 <i>Native Vegetation</i>	9
3.2.2 <i>Conservation Reserves in the District</i>	9
3.2.3 <i>Noxious Weeds</i>	9
3.3 THREATENED SPECIES RECORDS IN THE LOCALITY	9
3.4 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	10
4 EXISTING ENVIRONMENT	14
4.1 TOPOGRAPHY AND LANDFORM.....	14
4.2 GROUND WATER DEPENDENT ECOSYSTEMS.....	14
4.3 GEOLOGY AND SOILS.....	14
4.4 LAND USE AND PREVIOUS DISTURBANCE	14
4.5 PREVIOUS ECOLOGICAL STUDIES	14
5 FLORA AND VEGETATION COMMUNITIES	16
5.1 METHODOLOGY	16
5.1.1 <i>Field Survey and Mapping</i>	16
5.1.2 <i>Threatened Ecological Communities</i>	16
5.1.3 <i>Nomenclature</i>	17
5.1.4 <i>Limitations</i>	17
5.2 RESULTS	19
5.2.1 <i>Flora Species Richness</i>	19
5.2.2 <i>Vegetation Communities</i>	19
6 FAUNA AND THEIR HABITATS	27
6.1 METHODOLOGY	27
6.1.1 <i>Weather Conditions During Fauna Survey</i>	27

6.1.2	<i>Diurnal Birds</i>	27
6.1.3	<i>Scat and Sign Searches</i>	28
6.1.4	<i>Echolocation Call Recording</i>	28
6.1.5	<i>Motion Activated Infrared Cameras</i>	28
6.1.6	<i>Call Playback</i>	29
6.1.7	<i>Spotlighting</i>	29
6.1.8	<i>Herpetofauna Search</i>	29
6.1.9	<i>Habitat Assessment</i>	29
6.1.10	<i>Total Survey Effort</i>	30
6.1.11	<i>Nomenclature</i>	31
6.1.12	<i>Limitations</i>	31
6.2	RESULTS	31
6.2.1	<i>Threatened and Migratory Fauna</i>	31
6.2.2	<i>Avifauna</i>	32
6.2.3	<i>Mammals (excluding microchiropteran bats)</i>	32
6.2.4	<i>Microchiropteran bats</i>	32
6.2.5	<i>Reptiles</i>	33
6.2.6	<i>Frogs</i>	33
6.2.7	<i>Habitat Assessment</i>	33
6.2.8	<i>Corridors and Connectivity</i>	33
7	POTENTIAL IMPACTS	36
7.1	LOSS OF VEGETATION AND HABITAT	37
7.1.1	<i>Threatened Ecological Communities</i>	38
7.1.2	<i>Threatened Species Habitat</i>	38
7.1.3	<i>Hollow-bearing Trees</i>	38
7.2	WILDLIFE CONNECTIVITY AND HABITAT FRAGMENTATION	38
7.3	WEEDS	39
7.4	PESTS AND PATHOGENS	39
7.5	GROUNDWATER DEPENDENT ECOSYSTEMS	40
7.6	NOISE, VIBRATION AND LIGHT	40
7.7	IMPACT ON RELEVANT KEY THREATENING PROCESSES	40
7.8	CUMULATIVE IMPACTS	41
8	PROPOSED AMELIORATION MEASURES	43
8.1	AMELIORATION MEASURES TO BE UNDERTAKEN DURING THE PROJECT	43
8.2	AMELIORATION MEASURES TO BE UNDERTAKEN AT THE COMPLETION OF THE PROPOSED ACTIVITY	44
9	THREATENED AND MIGRATORY BIOTA EVALUATION	45
9.1	METHODS	45
9.2	RESULTS	45
10	IMPACT ASSESSMENT	65
10.1	SIGNIFICANCE ASSESSMENTS (TSC ACT)	65
10.2	SIGNIFICANCE ASSESSMENTS (EPBC ACT)	94
10.2.1	<i>Threatened Species</i>	94
10.2.2	<i>Migratory Species</i>	100
10.3	SUMMARY OF SIGNIFICANCE ASSESSMENTS	101
10.3.1	<i>Significance Assessments (TSC Act)</i>	101
10.3.2	<i>Significance Assessments (EPBC Act)</i>	101
10.4	OTHER MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE	101

11	CONCLUSION	102
12	REFERENCES	103
13	APPENDICES	107
	APPENDIX 1 – QUALIFICATIONS AND EXPERIENCE OF PERSONNEL	108
	APPENDIX 2 – PROTECTED MATTERS SEARCH TOOL RESULTS	111
	APPENDIX 3 – NOXIOUS WEEDS DATABASE SEARCH	122
	APPENDIX 4 – FLORA SPECIES RECORDED DURING THE FIELD SURVEY	127
	APPENDIX 5 – FAUNA SPECIES RECORDED DURING THE FIELD SURVEY	133

Maps, Figures & Tables

Map 1	Location of the Study Area	4
Map 2	Previous threatened and migratory bird records in the locality	11
Map 3	Previous threatened mammal records in the locality	12
Map 4	Previous threatened flora records in the locality	13
Map 5	Vegetation communities and locations of flora surveys across the Study Area.	26
Map 6	Location of Fauna Surveys across the Study Area	34
Map 7	Fauna Habitats and locations of threatened species recorded during surveys.	35
Map 8	Location and extent of drill transect lines across each vegetation type.	42
Figure 1:	Rationale for identifying White Box- Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands TEC listed under Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (DEH 2006).	18
Figure 2:	Photographic example of BVT BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.	22
Figure 3:	Photographic example of BVT213: Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands.	23
Figure 4:	Photographic example of BVT122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands.	25
Table 1:	Key indicators for TSC Act listed Box-Gum Woodland TEC	16
Table 2:	Summary of BVT BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.	21
Table 3:	Summary of BVT BR213 Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands.	22
Table 4:	Summary of BVT BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands.	24
Table 5	Weather conditions during the field survey from the Tenterfield (Federation Park) Weather Station.	27
Table 6	A summary of fauna survey type, effort and target fauna conducted for this assessment.	30
Table 7	Extent of Fauna habitats across the Study Area.	33
Table 8	Summary of vegetation loss for the Project by Biometric vegetation type and area ...	37
Table 9	Key threatening processes relevant to the Project	40
Table 10	Evaluation of the likelihood of threatened and migratory biota occurring within the Study Area	46

EXECUTIVE SUMMARY

EnviroKey Pty. Ltd (EnviroKey) were engaged by R.W Corkery & Co Pty. Ltd (RWC) on behalf of Torrington Minerals Pty. Ltd (the “Applicant”) to prepare an Ecology Assessment for the proposed Torrington Tungsten and Topaz Project (“the Project”) located approximately 40km south-west of Tenterfield, New South Wales.

The purpose of the Ecology Assessment is to determine the potential impacts to threatened species, populations and communities and their habitats as a result of a proposed activity in accordance with the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Ecology Assessment would be utilised to support a Review of Environmental Factors (REF) for the Project.

The Study Area comprises three Biometric vegetation types (BVT). These were as follows:

- BR116: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands
- BR213: Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands
- BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands

No threatened flora were recorded during the field surveys. One Threatened Ecological Community is present within the Study Area.

For fauna, one general fauna habitat is present; woodland/forest vegetation. A total of 70 fauna species were recorded comprising:

- 52 species of bird
- Two species of reptile
- Six species of frog
- 10 species of mammal (including one species of microchiropteran bat).

A total of five threatened or migratory fauna species were identified within the Study Area. These were the:

- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*), Vulnerable TSC Act
- Hooded Robin (*Melanodryas cucullata*), Vulnerable TSC Act
- Rufous Fantail (*Rhipidura rufifrons*), Migratory EPBC Act
- Scarlet Robin (*Petroica boodang*), Vulnerable TSC Act
- Varied Sittella (*Daphoenositta chrysoptera*), Vulnerable TSC Act

With consideration of the nature and extent of the proposed activity, the following amelioration measures are proposed:

- General land management amelioration measures (eg, pest animal control).
- Amelioration measures to be undertaken prior to commencement of the Project (eg, pre-clearance surveys, threatened species monitoring).

- Amelioration measures to be undertaken during the Project (eg, clearly marking areas to be cleared and areas to be retained).
- Amelioration measures to be undertaken after the proposed activity has been completed (eg, rehabilitation, monitoring).

This Ecology Assessment has adequately considered the ecology of the Study Area by:

- conducting a desktop analysis to consider biodiversity across the locality.
- conducting a field assessment that is consistent with OEH guidelines.
- adopting the precautionary principle in the assessment of impact.
- designing appropriate ameliorations measures to mitigate potential impacts to an acceptable level.

This report has determined that the Project is unlikely to have a significant effect of any listed threatened species, communities, populations and their habitats in accordance with s5A of the NSW *Environmental Planning & Assessment Act 1979* provided amelioration measures as detailed within **Chapter 8** are adopted, implemented and maintained. Therefore, a species impact statement is not required.

This report has also determined that the Project is unlikely to have a significant effect of any EPBC Act listed threatened and migratory biota and their habitats. Therefore, a referral to the Commonwealth Environment Minister is not warranted.

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1 INTRODUCTION

EnviroKey Pty. Ltd (EnviroKey) were engaged by R.W Corkery & Co Pty. Ltd (RWC) on behalf of Torrington Mineral Pty. Ltd (the “Company”) to prepare an Ecology Assessment for the proposed Torrington Tungsten and Topaz Project (“the Project”) located approximately 40km south-west of Tenterfield, New South Wales.

The purpose of the Ecology Assessment is to determine the potential impacts to threatened species, populations and communities and their habitats as a result of a proposed activity in accordance with the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Ecology Assessment would be utilised to support an Environmental Impact Statement (EIS) for the Project within the REF Area.

1.1 STUDY AREA

The Study Area is located within the Tenterfield Local Government Area (LGA), and the Border Rivers/Gwydir (Binghi Plateau Sub-region) Catchment Management Authority, and the Northern Tablelands Local Land Services region. The Study Area is much larger than the REF Area as it must consider potential direct and indirect impacts of the Project. The location of the Study Area is identified on **Map 1** and it is approximately 690 hectares in area.

1.2 SCOPE AND OBJECTIVES

The scope and objectives of this Ecology Assessment is to:

- Identify the Study Area by describing:
 - Topography and Landform
 - Geology and Soils
 - Land Use
 - Previous Ecological Surveys
- Describe the field survey methodologies used;
- Identify species and communities of conservation significance which are present or have the potential to be present, including threatened flora, fauna, their habitats and threatened ecological communities;
- Provide maps and photographs detailing vegetation communities, habitat extent and condition, the location of any significant flora and fauna species present;
- Undertake an evaluation of the potential for terrestrial threatened and migratory biota or populations listed within the schedules of the EPBC Act and the TSC Act to occur within the Study Area based on local records and the presence/quality of habitat;
- Assess the significance of the potential impacts of the proposed activity on species, populations, communities and their habitats that occur, or have the potential to occur within the Study Area pursuant to s5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), the TSC Act and the EPBC Act;
- Explicitly conclude whether the proposed activity would require a Species Impact Statement (SIS) or whether referral to the Commonwealth Environment Minister is required;

- Provide a series of amelioration measures designed to reduce risks and minimise the impacts of the proposed activity.

1.3 PROJECT DESCRIPTION

The Project would include the construction and operation of the following:

- Construction of up to 23.5km of transects approximately 2.5m wide.
- Drilling of between 15 000m and 17 000m of RC and DC drill holes with a typical depth of up to approximately 30m.
- Construction of drill sites along transects, with an additional disturbance area of approximately 42m² per site.
- Ancillary hand sampling of material from historic mining operations.

1.4 DEFINITIONS AND ACRONYMS

The following definitions and acronyms are used within this report.

CMA - Catchment Management Authority.

DC – Diamond core drilling

DotE - Department of the Environment.

EP&A Act - NSW *Environmental Planning and Assessment Act 1979*.

EPBC Act - Commonwealth *Environment Protection and Biodiversity Conservation Act 1995*.

HBT - hollow-bearing tree.

JORC – Joint Ore Reserves Committee

KTP – Key Threatening Process

LGA - Local Government Area.

likely - taken to be a real chance or possibility.

LLS - Local Land Services

locality - means the area within a 10 kilometre radius of the Study Area.

local population (migratory or nomadic fauna) - the population comprises those individuals that are likely to occur in the Study Area from time to time.

local population (resident fauna) - the population comprises those individuals known or likely to occur in the Study Area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to use habitats in the Study Area.

local population (threatened flora) - the population comprises those individuals occurring in the Study Area or the cluster of individuals that extend into habitat adjoining and contiguous with

the Study Area that could reasonably be expected to be cross-pollinating with those in the Study Area.

migratory species – a species specified in the schedules of the EPBC Act.

OEH – NSW Office of Environment & Heritage.

RCP – Reverse circulation percussion

region - means a biogeographical region that has been recognised and documented such as the Interim Biogeographical Regions of Australia (IBRA) (Thackway and Creswell 1995). The Study Area is located within the Binghi Plateau Bioregion.

RWC – R.W. Corkery & Co. PTY Limited.

SCA – State Conservation Area

Study Area – For the purpose of this assessment, the Study Area is approximately 690 hectares in area and defined on **Map 1**.

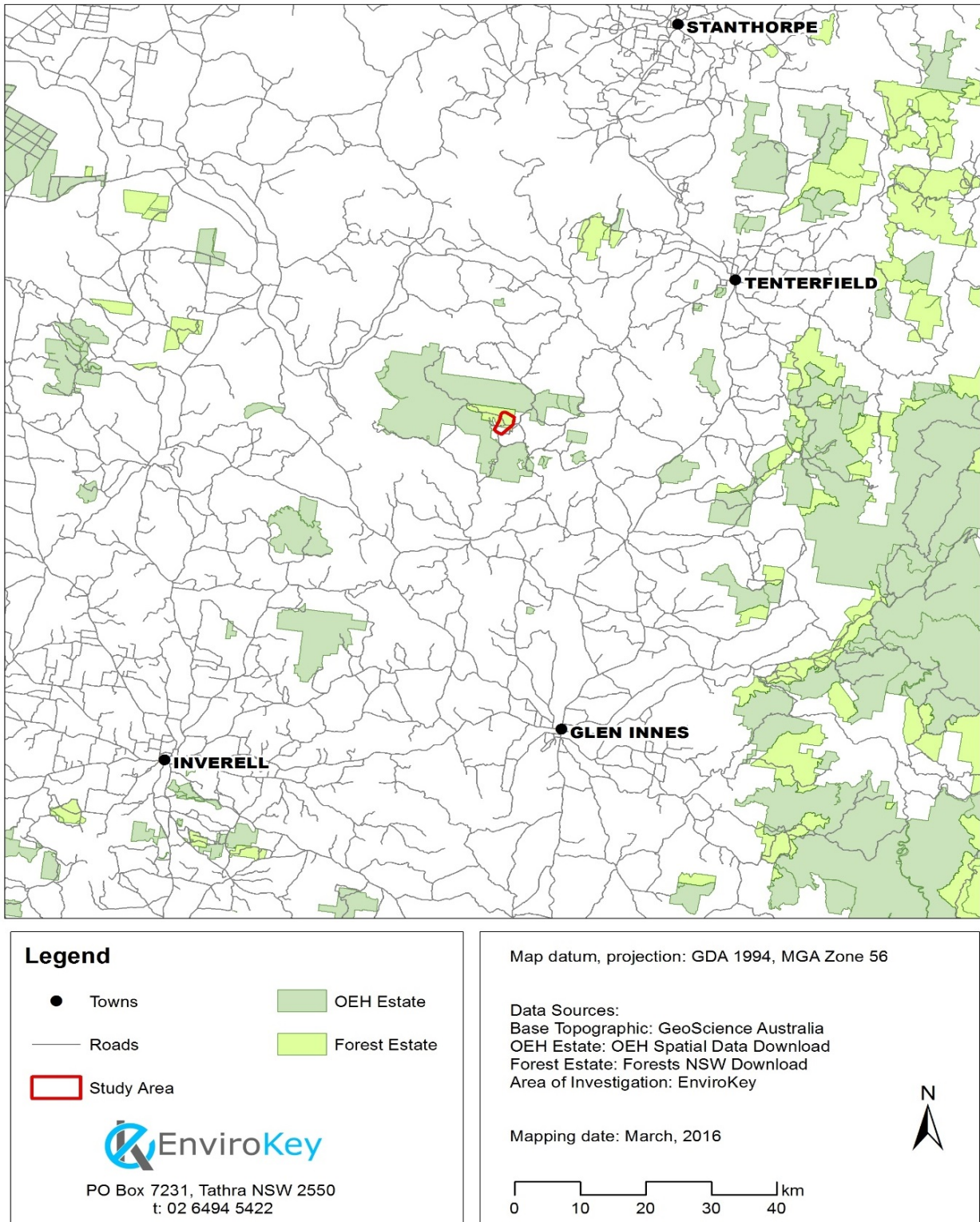
threatened biota - means those threatened species, endangered populations or endangered ecological communities considered known or likely to occur in the Study Area.

threatened species – a species specified in the schedules of the TSC Act or the EPBC Act.

TSC Act – NSW *Threatened Species Conservation Act 1995*.

1.5 QUALIFICATIONS AND EXPERIENCE OF PERSONNEL

The Ecology Assessment was led by Mr. Steve Sass (Principal Ecologist, B.App.Sci (Env.Sci) (Hons)) of EnviroKey. Field surveys were conducted by suitably qualified and experienced personnel. Previous studies are included within the Ecology Assessment and these were also prepared by suitably qualified and experienced personnel. Details of all personnel and their role in the preparation of the Ecology Assessment are provided (see **Appendix 1**).



Map 1 Location of the Study Area

2 LEGISLATIVE CONTEXT

2.1 THREATENED SPECIES CONSERVATION ACT 1995

The TSC Act specifies seven factors which must be considered by decision-makers regarding the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats (DECC 2007). These factors form part of the threatened species assessment process under the EP&A Act and are collectively referred to as the 'Seven-part Test' (DECC 2007).

Consent authorities have a statutory obligation to consider whether a Project is likely to significantly affect threatened species, populations or ecological communities, or their habitats by applying the Seven-part Test. If the determination is made that there is likely to be a significant effect then either;

- A Species Impact Statement (SIS) must be prepared and the concurrence of the Director-General of the NSW Office of Environment and Heritage (OEH) obtained prior to the consent authority making a determination, or
- The Project may be modified such that a significant effect on threatened species, populations or ecological communities, or their habitats is unlikely (DEC 2004).

This report applies the seven part test to species, populations and communities which may potentially be impacted by the Project in order to characterise the significance of the impact.

2.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation.

Under the EPBC Act, actions that have, or are likely to have a significant impact on a matter of National Environmental Significance (NES) require approval from the Australian Government Minister for the Environment, Heritage and the Arts (DotE 2013).

The nine matters of NES that are protected under the EPBC Act are:

- Listed threatened species and communities
- Listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine environment
- World heritage properties
- National heritage properties
- The Great Barrier Reef Marine Park
- Nuclear actions
- A water resource, in relation to coal seam gas development and large coal mining development.

Chapter 10 provides an assessment to ascertain whether the proposed activity would require referral to the Commonwealth.

2.3 FISHERIES MANAGEMENT ACT 1994

The NSW *Fisheries Management Act 1994* (FM Act) aims to conserve fish stocks, key habitats, threatened species, populations and ecological communities of fish and marine vegetation. It also aims to promote viable commercial fishing, aquaculture industries and recreational fishing.

This Ecology Assessment applies the seven-part test to species, populations and communities which may occur within the Study Area in order to characterise the significance of the impact.

2.4 STATE ENVIRONMENTAL PLANNING POLICY NO. 44

State Environmental Planning Policy (SEPP) No. 44 encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free-living populations would be maintained over their present range across 107 local government areas (LGA). Local councils cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

SEPP 44 aims to identify areas of *potential* and *core* Koala Habitat. These are described as follows:

- *Potential Koala Habitat* is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component; and
- *Core Koala Habitat* is defined as an area of land with a resident population of koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.

Tenterfield LGA is listed within Schedule 1 of SEPP 44 and is considered further in this report.

2.5 ECOLOGICAL SUSTAINABLE DEVELOPMENT

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic and environmental considerations in decision-making processes. In 1992, the Commonwealth and all state and territory governments endorsed the *National Strategy for Ecologically Sustainable Development*. In NSW, the concept has been incorporated in legislation such as the EP&A Act and Regulation.

For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act 1991* outline the following principles which can be used to achieve ESD.

- (a) The precautionary principle: that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions can be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
 - (ii) an assessment of the risk-weighted consequences of various options,
- (b) Inter-generational equity: that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
- (c) Conservation of biological diversity and ecological integrity: that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The aims, structure and content of this report are guided by these principles. The precautionary principle has been adopted in the assessment of impact; all reasonably foreseeable potential impacts have been considered and mitigated where a risk is present. Where uncertainty exists, measures have been suggested to address it.

3 REGIONAL CONTEXT

3.1 REGIONAL SCALE

3.1.1 Interim Bioregionalisation of Australia

The Study Area is located in the New England Tableland Bioregion of the Interim Bioregionalisation of Australia (IBRA7) (Thackway and Creswell 1995) and within the Binghi Plateau subregion (NPWS 2003a). The Bioregion extends from the north of Tenterfield to the south of Walcha with a total area of 3,004,202 hectares occupying 3.57% of the state (NPWS 2003a). Climatically, the Bioregion is persistently within a temperate to cool temperate area, with mean annual rainfall being between 653mm to 1765mm (NPWS 2003a).

Sands derived from granite influence the vegetation in parts of the bioregion, which is considered relatively low in fertility and structural integrity and are prone to erosion (NPWS 2003a). In basalt areas, shallow stony loams are found on steep areas and deep, red brown and brown to black, fertile, well-structured loams are found on flatter slopes (NPWS 2003a).

Geologically, the subregion is based on Permo-Carboniferous shales, slates and granite rocks influencing topography (NPWS 2003a). The undulating landscape is generally characterised by rugged rounded hills and valleys 700-1200m in altitude. The depth of soil is minimal and coarse compared to the soils of lower altitude and valley floors (NPWS 2003a).

3.1.2 Vegetation and Flora

Basalt derived soils consist of open forests and woodlands with species such as manna gum, black sallee and snow gum. Vegetated areas at high altitude are dominated by messmate and mountain gum with the occurrence of black cypress pine and orange gum are widespread on rocky outcrops in the north of the bioregion (NPWS 2003).

Due to the high level of diversity and endemism to the bioregion, The New England Tablelands is considered botanically significant (NPWS 2003). It contains 70 species of eucalyptus species and 68 species listed under the TSC Act, many of which are endemic to the bioregion (NPWS 2003).

3.1.3 Fauna

Within the bioregion 92 fauna species are listed under TSC Act, 18 endangered and 72 vulnerable. The bioregion has seen the extinction of two amphibian species (NPWS 2003). Within the fragmented woodlands of the New England Tablelands a large portion of the Regent Honeyeater population exists (NPWS 2003, Sattler & Creighton 2002) while it has been documented that ground-feeding insectivorous birds and some woodland and forest species have notably declined (NPWS 2003). The cause of this decline is a result of land clearing and fragmentation by agriculture (NPWS 2003).

3.1.4 Conservation Reserves

The New England Tableland Bioregion has around 220,481.15 hectares or 7.7 per cent in areas of conservation management. The majority of this is taken up by national parks and nature reserves (182,049.64 hectares or 6.36 per cent of the Bioregion) (NPWS 2003a).

Fifteen land holders have entered into private land conservation arrangements under the *National Parks and Wildlife Act 1974* totalling around 6,837 hectares or 0.24 per cent of the Bioregion (NPWS 2003a). Sixteen properties have property vegetation plans (1,046.91 hectares or 0.04 per cent of the Bioregion) while State Forests occupy an area of 136,064.9 hectares (4.76%) of the Bioregion (NPWS 2003a).

3.2 DISTRICT SCALE

3.2.1 District Habitat Features

3.2.1.1 Watercourses and Wetlands

With the exception of Beardy River and Severn River approximately 10km and 35km, respectively, to the south west of the Study Area, there are no major watercourses present within the district. Several minor ephemeral watercourses dissect the district, and are likely to provide locally important habitat for some species of waterbirds from time to time. There are three permanent man-made water bodies within the Study Area. A dam is located in the north-west section of the Study Area and two water holes which are the direct result of previous mining activity, located in the northern half of the Study Area and within the REF Area (**Map 5**).

3.2.1.2 Native Vegetation

Various stringybark species, dominate the west of the district with New England Blackbutt, Yellow Box, Apple Box, Blakely's Red Gum, Black Cypress Pine and widespread Orange Gum dominating in the east (NPWS 2003). The district vegetation is considered similar to the current state of regional vegetation in that various degrees of clearing for broad-scale agricultural activities such as cropping and grazing has occurred. The district vegetation has also endured modification through feral animals such as foxes, rabbits and pigs.

3.2.2 Conservation Reserves in the District

One state conservation area and one nature reserve are found within the district. These being Severn Nature Reserve (5,750 hectares, around 30km south west) and Torrington Conservation Area (30,000 hectares) that adjoins Torrington State Forest (OEH 2016a). Forest Land State Forest (12,000 hectares) and Spirabo State Forest (9,600 hectares) are located around 40-50km to the east of the Study Area.

3.2.3 Noxious Weeds

A search of the Noxious Weeds Declarations from the NSW Department of Primary Industries (DPI) website was carried out in April 2016 for the Tenterfield LGA, identifying 130 noxious weeds with the potential to occur within the Study Area (**Appendix 3**).

No declared noxious weeds were identified within the Study Area (see **Appendix 4**).

3.3 THREATENED SPECIES RECORDS IN THE LOCALITY

Using the OEH Threatened Species, Populations and Ecological Communities of NSW predictor database (29 March 2016), a total of 54 threatened biota are known or predicted to occur within the Binghi Plateau Sub-region of the Border Rivers/Gwydir CMA region (OEH

2016c). Despite CMA subregions no longer existing as administrative boundaries, they are still used by OEH as a mean of searching for previous records of threatened biota. However, the extensive area covered by this CMA subregion is likely to include a wide variety of habitats not present within the Study Area. To refine this search, searches of the NSW BioNet database (incorporating flora records) administered by the NSW Office of Environment and Heritage (OEH) were made on the 22 March 2016 using a 10 kilometre search area around the Study Area (OEH 2016b).

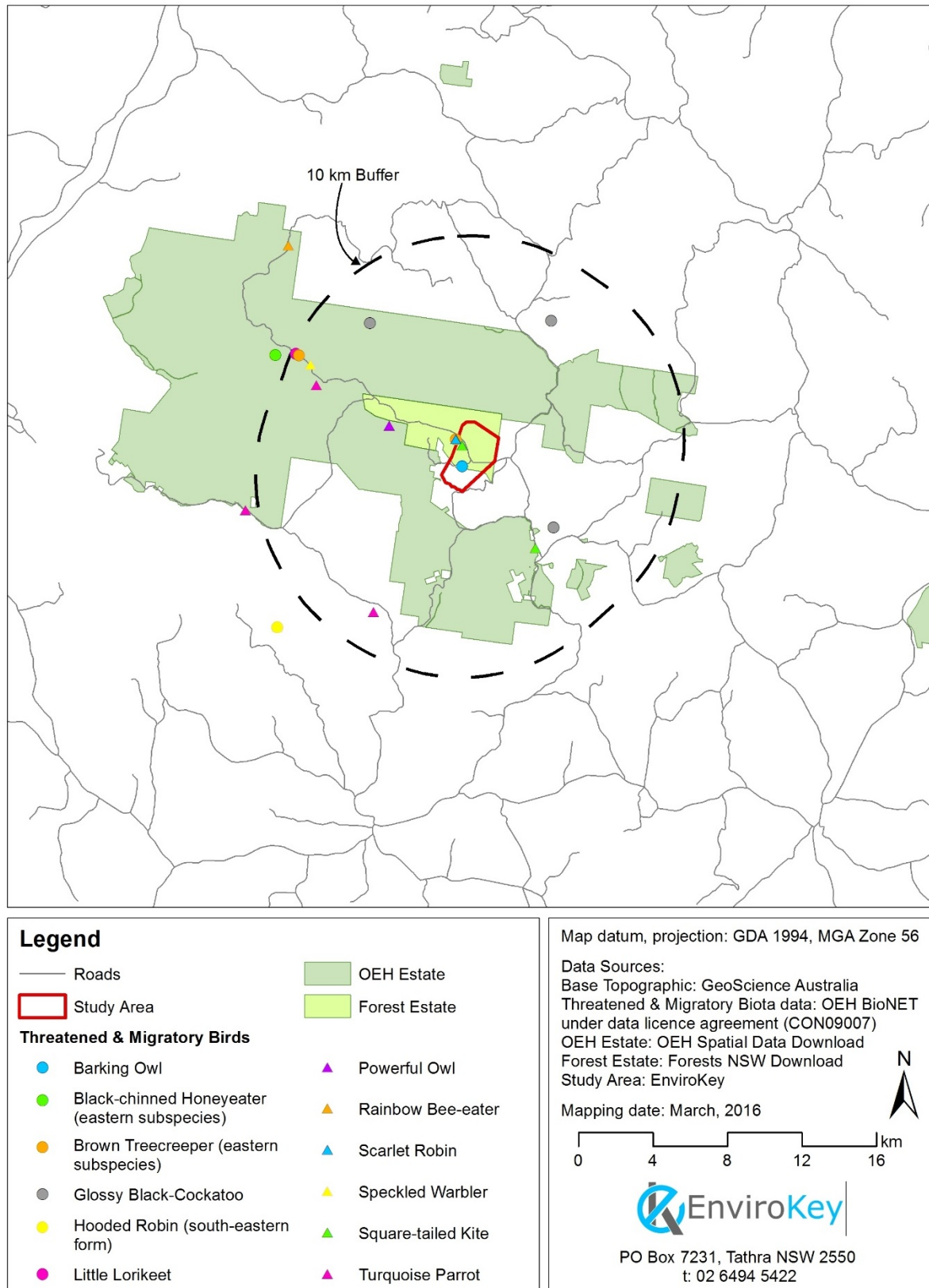
This search revealed 34 threatened species comprising 12 species of bird, seven species of mammal and 15 species of flora (**Map 2 - Map 4****Map 3**).

3.4 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

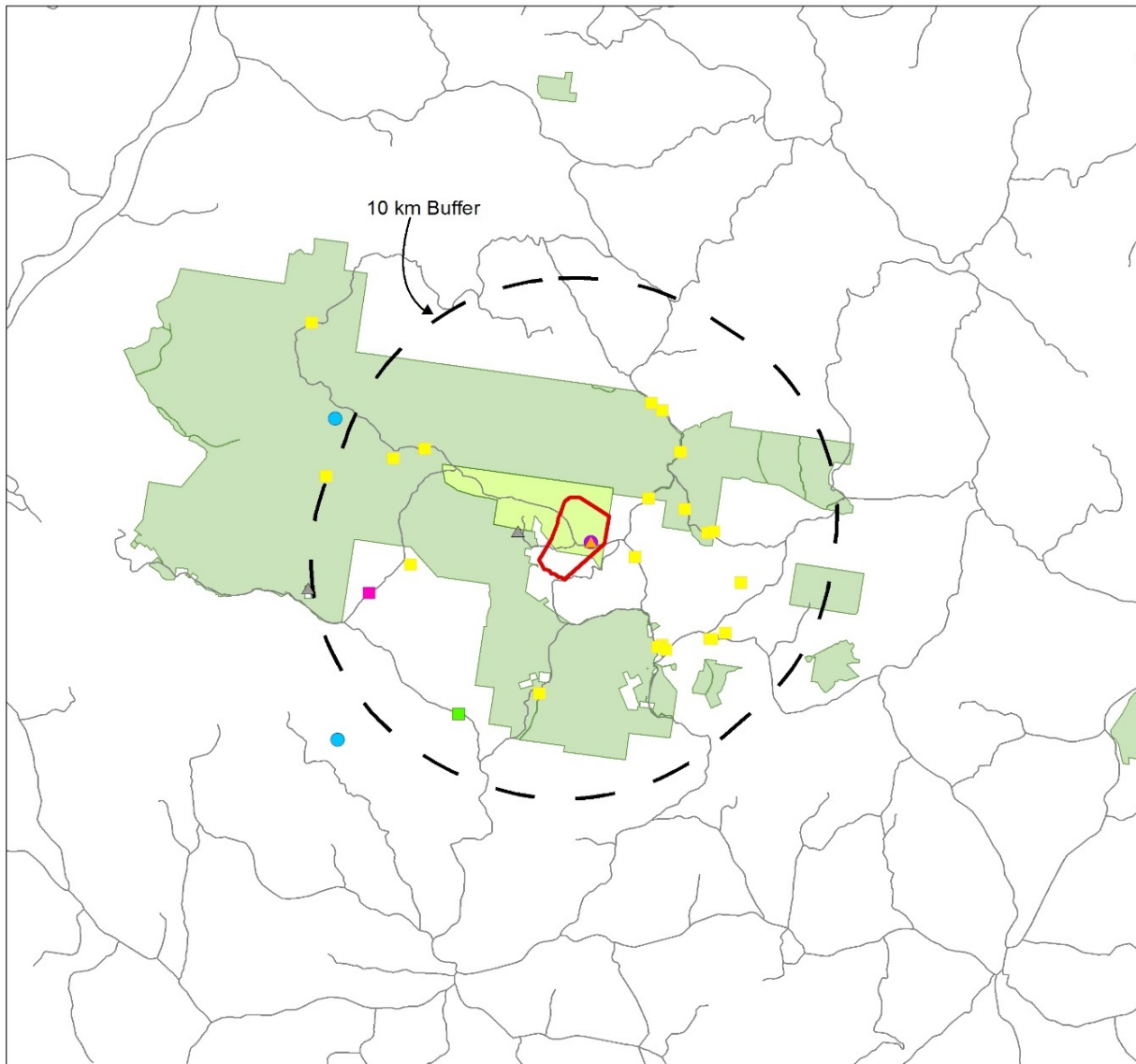
A search on the 22 March 2016 using the Protected Matters Search Tool provided under the EPBC Act using a 10 kilometre buffer around a point representing the Study Area identifies 58 Matters of National Environmental Significance (NES) (DotE 2016). These can be summarised as follows:

- 5 threatened ecological communities
- 42 threatened species
- 11 migratory species

These are considered further in **Chapter 9** with the search results provided in full in **Appendix 2**.



Map 2 Previous threatened and migratory bird records in the locality



Legend

- Roads
- Study Area
- OEH Estate
- Forest Estate

Threatened Mammals

- Eastern Bentwing-bat
- Eastern False Pipistrelle
- ▲ Greater Broad-nosed Bat
- ▲ Koala
- New Holland Mouse
- Spotted-tailed Quoll
- Squirrel Glider

Map datum, projection: GDA 1994, MGA Zone 56

Data Sources:
 Base Topographic: GeoScience Australia
 Threatened & Migratory Biota data: OEH BioNET
 under data licence agreement (CON09007)
 OEH Estate: OEH Spatial Data Download
 Forest Estate: Forests NSW Download
 Study Area: EnviroKey

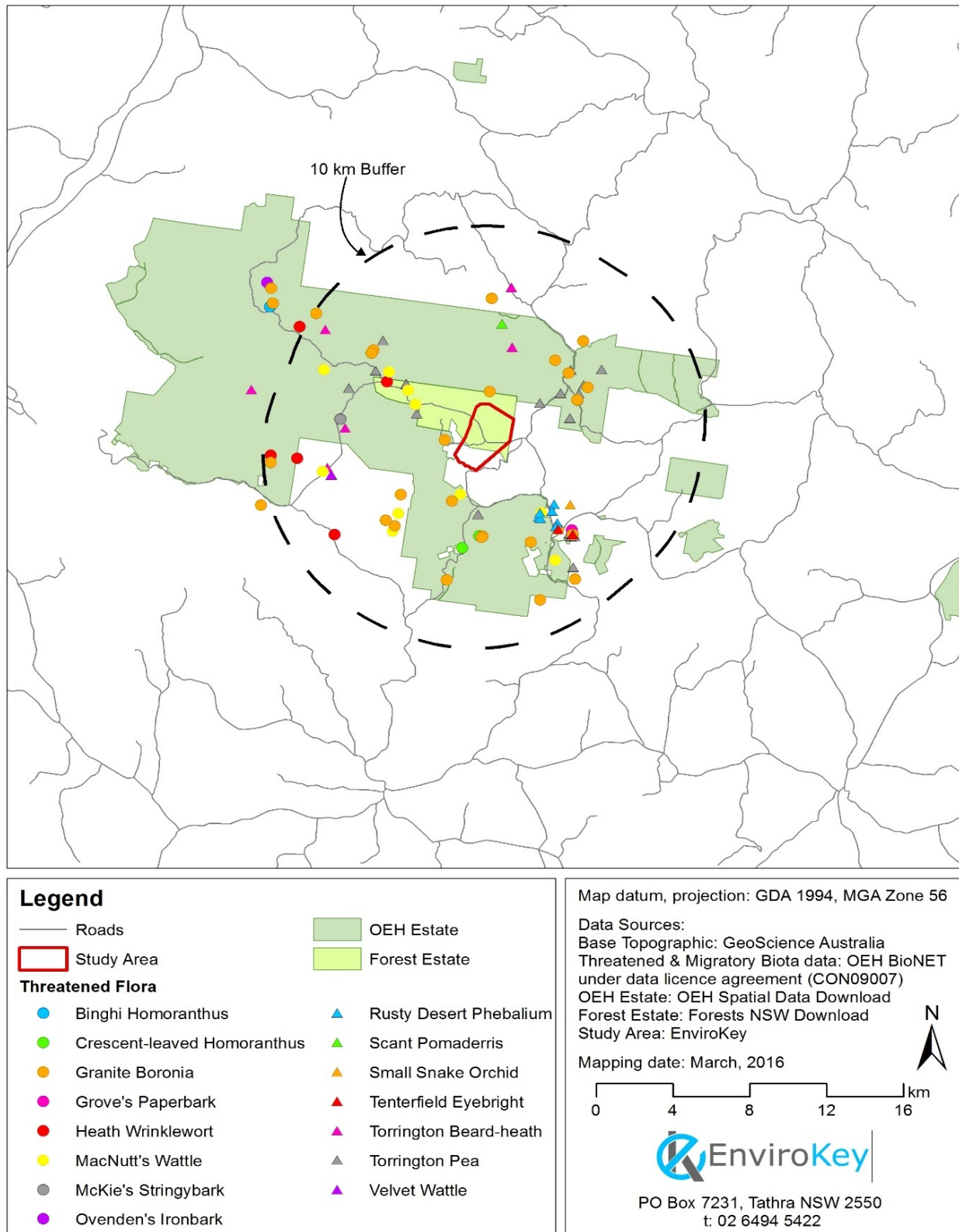
Mapping date: March, 2016

0 4 8 12 16 km



PO Box 7231, Tathra NSW 2550
 t: 02 6494 5422

Map 3 Previous threatened mammal records in the locality



Map 4 Previous threatened flora records in the locality

4 EXISTING ENVIRONMENT

4.1 TOPOGRAPHY AND LANDFORM

The Study Area is located within the New England Tableland Bioregion and Binghi Plateau sub-region of the former Border Rivers/Gwydir Catchment Management Authority (CMA).

4.2 GROUND WATER DEPENDENT ECOSYSTEMS

A review of the Atlas of Groundwater Dependent Ecosystems on 9 April 2016 identified that there are no groundwater dependant ecosystems within 10km of the Study Area. Beardy River, located approximately 10km southwest of the Study Area, is the nearest Groundwater Dependent Ecosystem (BOM 2016a).

4.3 GEOLOGY AND SOILS

The Study Area is situated within the Inverell Plateau Granites Mitchell Landscape. The landscape has widely distributed and defined undulating plateau with domed peaks on Permian New England granites and granodiorites (Mitchell 2002). Elevation is between 900 metres – 1200 metres. Vegetation varies and is dependent on topography, soil, drainage and temperature (Mitchell 2002). Shallow gritty loam thickens downslope to red or yellow earthy sand and red, red-yellow and yellow texture-contrast soil on lower slopes and valley floors (Mitchell 2002).

4.4 LAND USE AND PREVIOUS DISTURBANCE

Based on the results of the field survey, the Study Area has previously been the subject of some mining and logging activities but these do not appear to have occurred within the last two decades. The main land use for Torrington State Forest is recreation. It appears that the previous disturbance has contributed to the formation of habitat with the accumulation of logs and piles of rocks associated with mining activities.

4.5 PREVIOUS ECOLOGICAL STUDIES

It is understood that four reports have been prepared considering biodiversity in the vicinity of the Study Area. These being:

- *The Torrington State Conservation Area: Plan of Management* (NPWS 2003b)
- *Hotspots Fire Project; Fire and Vegetation of the Border Rivers-Gwydir Region* (al 2014)
- Review of Environmental Factors, Exploration License No. 5445, for Topalite Resources PTY. LTD. (Pratt 1999)
- Managing and Conserving Native Vegetation: Information for Land Managers in the Border Rivers-Gwydir Catchments - Book two Vegetation Profiles (Edited by Miller *et al* 2013).

All reports make reference to the Torrington State Conservation Area as well as the land immediately adjoining Torrington State Forest and is therefore not dissimilar in vegetation structure. These are considered, where appropriate, throughout this assessment.

5 FLORA AND VEGETATION COMMUNITIES

5.1 METHODOLOGY

5.1.1 Field Survey and Mapping

Field surveys of the Study Area were conducted on 26 – 29 September 2015. The inclusion of a Spring dataset provides a temporal consideration of the biodiversity of the Study Area that could be included in any additional survey and assessment that may be conducted for an Environmental Assessment should the project proceed to seeking mining approval.

A botanical survey involved traversing the Study Area by vehicle and on-foot for the purpose of identifying stratification units. Botanical surveys were conducted using two methods; Biometric plots and transects as outlined by the Biobanking Assessment Methodology (BBAM) as well as the 'random meander' method (Cropper 1993). The objective of the botanical survey was to collect data on species occurrence, structural attributes and relative abundance and was documented for each vegetation community present. The approximate boundaries of vegetation communities were mapped, as was any significant vegetation or species, including threatened flora (if present). Vegetation condition was also recorded with consideration of relevant CMA benchmarks as detailed for each Biometric vegetation type (BVT).

Flora species lists were compiled using the random meander method (Cropper 1993), rather than quadrants, to maximise the opportunity of detecting significant or sparsely distributed flora species. Flora was identified using the online version of the Flora of NSW (PlantNET 2016).

Surveys for flora and vegetation communities were completed under the authority of a current Scientific Licence issued under Clause 22 of the *National Parks and Wildlife Regulation 2002* and section 132C of the *National Parks and Wildlife Act 1974* by NSW OEH.

Maps showing the approximate extent of vegetation communities were produced during the field surveys and by air-photo interpretation at their completion using the geographic information system (GIS) ArcMap 10.

5.1.2 Threatened Ecological Communities

Vegetation communities were analysed and compared with the NSW Biometric Vegetation Communities database, determinations made by the NSW Scientific Committee in relation to the TSC Act, and information from Species Profile and Threats Database (SPRAT) (EPBC Act) to determine if any were part of a threatened ecological community (TEC). The *Threatened Species Conservation Act 1995* listed TEC White Box, Yellow Box, Blakely's Red Gum Woodland is well known from across the area and its presence was also determined for the study area.

Given that there are key differences between BGW TEC under the TSC Act and EPBC Act, the evaluation relied upon existing information from relevant agencies (**Table 1**; **Figure 1**) (DEH 2006; NPWS n.d).

Table 1: Key indicators for TSC Act listed Box-Gum Woodland TEC

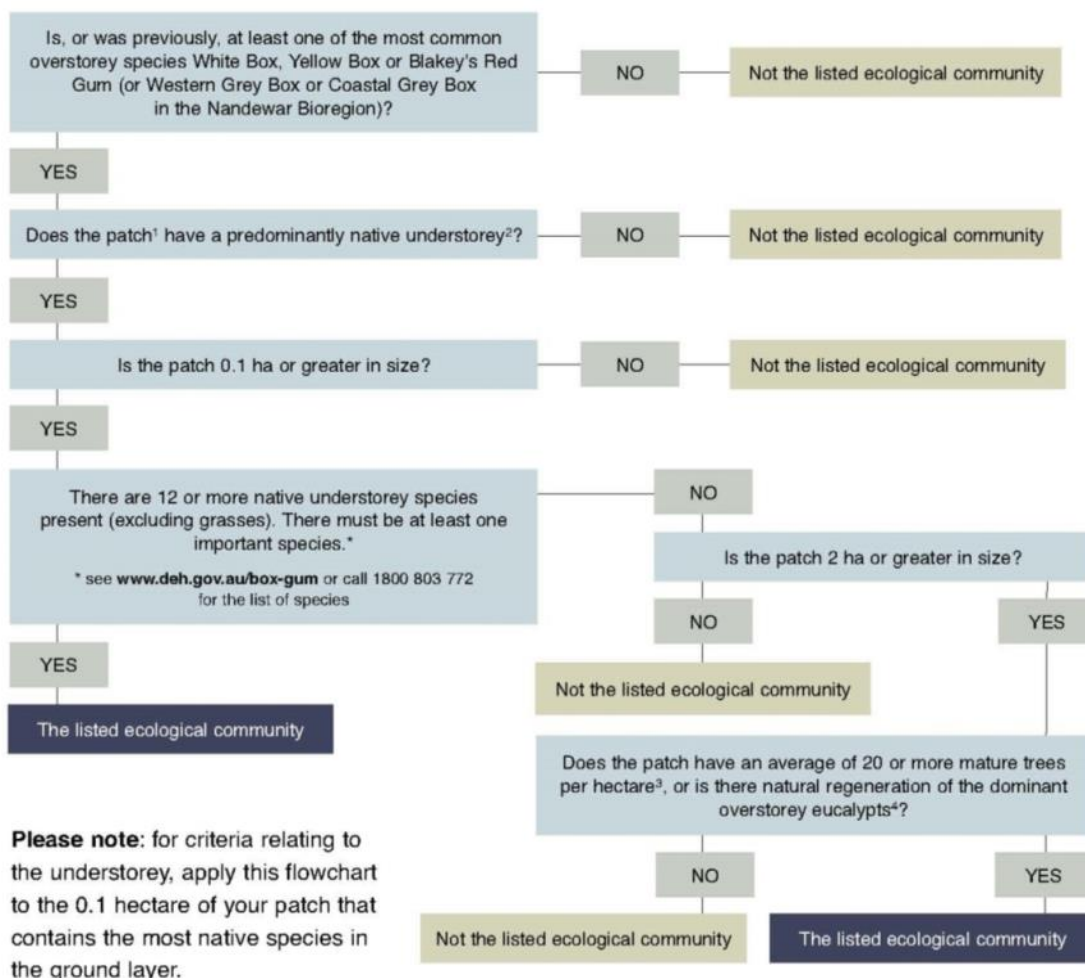
1 The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregions	Go to 2
1 The site is outside the above bioregions	The site is not Box-Gum Woodland
2 Understorey/groundcover has no native species in the understorey and the site is unlikely to respond to assisted natural regeneration	The site is not Box-Gum Woodland
2* The understorey is otherwise	Go to 3
3 The site has trees	Go to 4
3* The site is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing	Go to 5
4 White Box, Yellow Box or Blakely's Red Gum or a combination of these species, are or were present	Go to 5
4* White Box, Yellow Box or Blakely's Red Gum have never been present	The site is not Box-Gum Woodland
5 The site is predominately grassy	The site is Box-Gum Woodland
5* The understorey of the site is dominated by shrubs excluding pioneer species	The site is not Box-Gum Woodland

5.1.3 Nomenclature

Nomenclature within this report follows that used by Benson (2006, 2008) and Benson *et al.* (2006) for vegetation communities and the online version of the Flora of NSW for individual species (PlantNET 2016).

5.1.4 Limitations

While this study was completed during early Spring 2015 when field conditions were conducive to detecting many of the flora that are known to occur in the area, a common limitation of many ecological studies is the short period of time in which they are conducted. When combined with a lack of seasonal sampling this can lead to either low detection rates or false absences being reported. This is also particularly relevant to cryptic flora species that may not have been flowering making detection difficult. For these reasons, it should be recognised that it may be impossible to rule out species absence for some species during field surveys. Further analysis of the potential for species presence based on available habitats and their potential to be impacted by the proposed activity occurs within **Chapter 9** and **10**.



- ¹ Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
- An area that contains five or more trees in which no tree is greater than 75 m from another tree; or
 - The area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha or greater.

- ² A predominantly native ground layer is one where at least 50 percent of the perennial vegetation cover in the ground layer is made up of native species. The best time of year to determine this is late autumn when the annual species have died back and have not yet started to regrow.
- ³ Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.
- ⁴ Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Figure 1: Rationale for identifying White Box- Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands TEC listed under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (DEH 2006).

5.2 RESULTS

5.2.1 Flora Species Richness

The field survey identified a total of 73 flora species. This included:

- 70 native species
- Three introduced species.

No threatened flora were identified during the field survey. However, given that not all of the Study Area was extensively searched, nor was the exact location of the proposed drilling sites known, there is a high chance of threatened flora species occurring there based on the vegetation condition meeting moderate-good criteria.

A full list of flora species recorded during the field survey is detailed within **Appendix 4**.

5.2.2 Vegetation Communities

Three native vegetation communities were present (**Map 5**). The vegetation communities present were classified to the OEH biometric vegetation type for the Border Rivers/Gwydir CMA however these were determined as the 'best fit' based on the vegetation class, species present and other diagnostic features. It should be understood that often the description of vegetation types does not match the vegetation encountered during field surveys.

Several documents and digital maps covering the Torrington area were consulted to determine the final vegetation communities. The Vegetation Information System (VIS) mapping portal, SIX Maps, administered by the OEH, was consulted which contained various maps covering the Study Area. The Forest Ecosystem Classification and Mapping for the Upper and Lower North East CRA Regions (NPWS 1999) indicated that almost the entire area covered by the Study Area was mapped as Forest Ecosystem type 196: Broad-leaved Stringybark - Apple Box. More recent mapping from 2008, Vegetation Mapping for the Namoi and Border Rivers-Gwydir CMAs (Ecological 2008) identified the vegetation in close proximity to the Study Area (no details are provided for the Torrington State Forest however the vegetation type on either side is the same) as a Pendant Grassy Forest with *Eucalyptus brunnea* - *E. melliodora* - *E. caliginosa*. Based on the classifications made by Keith (2004) of Northern Tableland Dry Sclerophyll Forests, combined with Biometric Vegetation data, Ecological (2008) created a Regional Vegetation Classification (RVC) for the area which was 'Round-leaved Gum Shrubby woodlands and forest in the Torrington area, New England Tablelands.' This corresponds most closely with the BR213: Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands, which is detailed below. This was mapped for the northern section of the Study Area due to the presence of Round-leaved Gum (*E. brunnea*) however there was also a co-dominant stringybark resulting in the determination for 'best fit' of BR213.

The following documents were also consulted to gain a clearer picture of the vegetation present:

- Torrington State Conservation Area Plan of Management was also consulted (NPWS 2003)

- Review of Environmental Factors, Exploration License No. 5445, for Topalite Resources PTY. LTD. (Pratt 1999)
- Managing and Conserving Native Vegetation: Information for Land Managers in the Border Rivers-Gwydir Catchments - Book two Vegetation Profiles (Edited by Miller *et al* 2013).

The Torrington SCA POM indicates that the vegetation communities in the area consist of Grassy forest complex on metasediments, the field surveys confirmed that the communities present were open forests as the percentage canopy cover was too high to be a woodland. The two forest communities listed in the POM are Pendant Grassy Forests consisting of *E. brunnea* and *E. Caliginosa* or *E. melliodora* and *E. caliginosa*. The REF undertaken for a previous exploration also indicated that the vegetation communities consisted of open forest with *E. deanii*, *E. caliginosa* and *E. andrewsii* or *E. laevopinea*, *E. blakelyi* and *E. melliodora*. Therefore based on the previous surveys undertaken along with the species recorded during the field surveys consisting of Broad-leaved Stringybark (*E. caliginosa*) dominant in much of the canopy with scattered occurrences of Mountain Gum (*E. dalrympleana*) and Apple Box (*E. bridgesiana*), that this was closest fit with the description of BVT122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands. There were also scattered occurrences of Rough-barked Apple (*Angophora floribunda*), New England Blackbutt (*E. andrewsii*), Yellow Box (*E. melliodora*), Blakely's Red Gum and Youman's Stringybark (*E. youmanii*).

The dominance of Yellow Box and Blakely's Red Gum in some small discrete patches indicated that a different community was present which fit the description of BVT116: Blakely's Red Gum - Yellow Box grassy open forest of woodland of the New England Tablelands.

A description of each of the BVTs present is included below.

Biometric Vegetation Type BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands

'Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands' is present given the dominance of Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*Eucalyptus blakelyi*) as canopy species. This is listed as vegetation community BR116 in the NSW Vegetation Types Database (OEH 2016a) and is described as a grassy woodland that occurs on undulating areas at intermediate to high altitudes. The dominant canopy species are Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*), Rough-barked Apple (*Angophora floribunda*), with the main associated species being Apple Box (*Eucalyptus bridgesiana*), Manna Gum (*Eucalyptus viminalis*), New England Peppermint (*Eucalyptus nova-anglica*), Broad-leaved Stringybark (*Eucalyptus caliginosa*), Silvertop Stringybark (*Eucalyptus laevopinea*), Youman's Stringybark (*Eucalyptus youmanii*). Characteristic groundcover species include Kangaroo Grass (*Themeda australis*), Snowgrass (*Poa sieberiana* var. *sieberiana*), Barbed Wire Grass (*Cymbopogon refractus*) and *Lespedeza juncea* subsp. *sericea*. This vegetation community is listed as a TEC in the OEH NSW Vegetation Types Database; the composition of the flora species indicates that this community fits the identification criteria for TSC Act listed White Box, Yellow Box Blakely's Red Gum Grassy Woodland (Box-Gum Woodland). This TEC is also listed under the Commonwealth EPBC Act as the vegetation present fits the specific criteria for the EPBC Act TEC.

Table 2 provides a summary of this vegetation community within the Study Area. **Map 5** details the extent of the community while **Figure 2** shows photographic examples.

Table 2: Summary of BVT BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.

Descriptor	Response
Extent within REF Study Area (approx.)	6.56 hectares with canopy of BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands occur within the REF Study Area. 1.86 hectares occurs within the Primary Resource Target Area and 3.25 hectares occurs within the Secondary Resource Target Area.
Description	<p>Canopy: A moderately tall grassy woodland with Yellow Box (<i>Eucalyptus melliodora</i>) canopy and Blakely's Red Gum (<i>E. blakelyi</i>) with scattered occurrences of Rough-barked Apple (<i>Angophora floribunda</i>) and various other Eucalyptus species. The canopy height ranged from 15m up to about a maximum of 25m tall.</p> <p>Understorey: There was generally no native shrub layer present or very sparse shrub layer. Some patches had dense regrowth of various Acacia species as a response to a recent fire however it is not expected that this would be typical of this community. These Acacia species would be a pioneer species responding to the disturbance however most would die before reaching maturing in the canopy.</p> <p>Groundcover: This was most often dominated by native grasses such as Weeping Grass (<i>Microlaena stipoides</i>) and various forbs including Kidney Weed (<i>Dichondra repens</i>).</p>
Condition	Moderate to good condition in accordance with BBAM. Very low exotic flora presence.
Threatened flora	None recorded.
Threatened community?	Yes, this vegetation type is listed as a TEC. The flora present corresponds with the identification guidelines for Box-Gum Woodland (NPWS undated). This TEC is listed under the TSC Act and the vegetation meets EPBC Act criteria in that it is greater than 2 hectares in area and regeneration is evident.



Figure 2: Photographic example of BVT BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.

Biometric Vegetation Type BR213 Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands

The native vegetation community 'Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands' is present given the presence of Silvertop Stringybark (*Eucalyptus laevopinea*), Round-leaved Gum or Brown Gum (*Eucalyptus brunnea*) and New England Blackbutt (*Eucalyptus andrewsii*). This is listed as vegetation community BR213 in the NSW Vegetation Types Database (OEH 2016a) and is described as an open forest or woodland that is restricted to the Torrington area of far north New England Tablelands. The dominant canopy species are Silvertop Stringybark (*Eucalyptus laevopinea*), Round-leaved Gum (*Eucalyptus brunnea*), Western New England Blackbutt (*Eucalyptus andrewsii*). This vegetation community is **not** listed as a TEC in the OEH NSW Vegetation Types Database.

Table 3 provides a summary of this vegetation community within the study area. **Map 5** details the extent of the community while **Figure 3** shows photographic examples.

Table 3: Summary of BVT BR213 Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands.

Descriptor	Response
Extent within REF Study Area (approx.)	120.87 hectares BVT BR213 Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands occurs within the Study Area. 12.48 hectares occurs within the Primary Resource Target Area and 42.68 hectares occurs within the Secondary Resource Target Area.
Description	Canopy: A moderately tall to very tall open forest woodland with Round-leaved

Descriptor	Response
	<p>Gum (<i>E. brunnea</i>) and Silver-leaved Stringybark (<i>E. laevopinea</i>) were co-dominant or in various levels of dominance with New England Blackbutt (<i>E. andrewsii</i>) sometimes dominant in small patches. There were also scattered occurrences of various other eucalypts. The canopy height ranged from 15m up to about a maximum of 30m tall.</p> <p>Understorey: There was generally a sparse shrub layer present with Hoary guinea flower (<i>Hibbertia obtusifolia</i>), Urn-heath (<i>Melichrus urceolatus</i>) and Poison Pimelea (<i>Pimelea neo-anglica</i>). Some patches had dense regrowth of various Acacia species as a response to a recent fire however it is not expected that this would be typical of this community. These Acacia species would be a pioneer species responding to the disturbance however most would die before reaching maturing in the canopy.</p> <p>Groundcover: This was most often very sparse with a high cover of leaf litter and logs however there were a variety of native grasses present such as Speargrass (<i>Asutrostipa</i> sp.), Hedgehog Grass (<i>Echinopogon</i> sp.) Weeping Grass (<i>Microlaena stipoides</i>) and Tussock Grass (<i>Poa sieberiana</i> var. <i>sieberiana</i>).</p>
Condition	Moderate to good condition in accordance with BBAM. Very low exotic flora presence.
Threatened flora	None recorded.
Threatened community?	No



Figure 3: Photographic example of BVT213: Silverleaved Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands.

Biometric Vegetation Type BR122 Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands

The native vegetation community 'Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands' is present given the presence of Broad-leaved Stringybark (*Eucalyptus caliginosa*) and Apple Box (*E. bridgesiana*) along with Mountain Gum (*E. dalrympleana*) and scattered occurrences of various eucalypts such as Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*), New England Blackbutt (*E. andrewsii*) and Youman's Stringybark (*E. youmanii*). This is listed as vegetation community BR122 in the NSW Vegetation Types Database (OEH 2016a) and is described as an open forest to 20m tall that occurs on flats and lower slopes. The dominant canopy species are Broad-leaved Stringybark (*Eucalyptus caliginosa*), Mountain Gum (*Eucalyptus dalrympleana* subsp. *heptantha*) with the main associated species being Apple Box (*Eucalyptus bridgesiana*), Narrow-leaved Peppermint (*Eucalyptus radiata* subsp. *sejuncta*). This community has characteristic mid-storey species including *Hibbertia obtusifolia*, *Melichrus urceolatus*, *Brachyloma daphnoides* and a diverse range of groundcover species. This vegetation community is **not** listed as a TEC in the OEH NSW Vegetation Types Database.

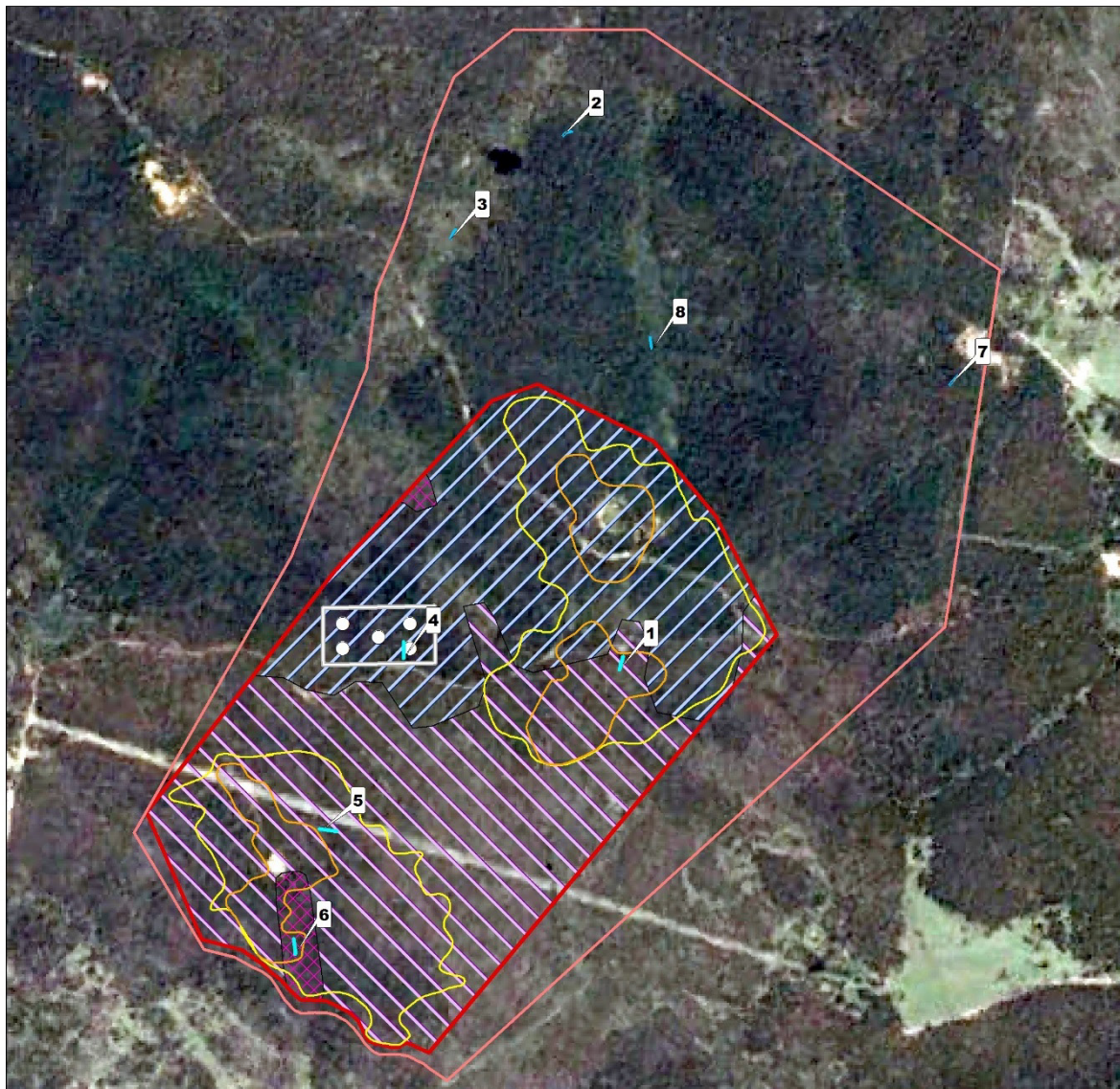
Table 4 provides a summary of this vegetation community within the Study Area. **Map 5** details the extent of the community while **Figure 4** shows photographic examples.

Table 4: Summary of BVT BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands.

Descriptor	Response
Extent within footprint (approx.)	164.26 hectares BVT BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands occurs within the Study Area. 21.76 hectares occurs within the Primary Resource Target Area and 50.27 hectares occurs within the Secondary Resource Target Area.
Description	<p>Canopy: A moderately open forest with Broad-leaved Stringybark (<i>E. caliginosa</i>) and some Mountain Gum (<i>E. dalrympleana</i>) with occasional occurrences of Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>), New England Blackbutt (<i>E. andrewsii</i>) and Youman's Stringybark (<i>E. youmanii</i>). The canopy height ranged from 10m up to about a maximum of 20m tall.</p> <p>Understorey: There was generally a sparse shrub layer present with Hoary guinea flower (<i>Hibbertia obtusifolia</i>) and Beard-heath (<i>Leucopogon melaleucoides</i>). Some patches had dense regrowth of various Acacia species as a response to a recent fire however it is not expected that this would be typical of this community. These Acacia species would be a pioneer species responding to the disturbance however most would die before reaching maturing in the canopy.</p> <p>Groundcover: This was most often very sparse with a high cover of leaf litter and logs however there were a variety of native grasses present such as Speargrass (<i>Austrostipa</i> sp.), Hedgehog Grass (<i>Echinopogon</i> sp.) Weeping Grass (<i>Microlaena stipoides</i>) and Tussock Grass (<i>Poa sieberiana</i> var. <i>sieberiana</i>).</p>
Condition	Moderate to good condition in accordance with BBAM. Very low exotic flora presence.
Threatened flora	None recorded.
Threatened community?	No



Figure 4: Photographic example of BVT122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands.



Legend

- Proposed Sterilisation Drill Hole
 - Biobanking Transect
 - Study Area
 - Primary Resource Target Area
 - Processing Area
 - REF Area
 - Secondary Resource Target Area
- Vegetation**
- BR116: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands
 - BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands
 - BR213: Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands

Map datum, projection: GDA 1994, MGA Zone 56

Data Sources:
 Biobanking Transect: Envirokey
 Vegetation Communities: Envirokey
 Area of Interest: RW Corkery and Co.
 Aerial: Google Earth

Mapping date: April, 2016

0 0.35 0.7 1.05 1.4 km



PO Box 7231, Tathra NSW 2550; t: 02 6494 5422

Map 5 Vegetation communities and locations of flora surveys across the Study Area.

6 FAUNA AND THEIR HABITATS

6.1 METHODOLOGY

Field surveys were completed to develop a comprehensive understanding of fauna and their habitats that occur, or potentially occur within the Study Area on Saturday 26 to late Tuesday 29 September, 2015. All field surveys were conducted by suitably qualified and experienced ecologists (qualifications provided in **Appendix 1**).

Field surveys were conducted under the authority of a current Scientific License issued under Clause 22 of the *National Parks and Wildlife Regulation 2002* and section 132C of the *National Parks and Wildlife Act 1974* by OEH and an Animal Research Authority approved by, and in accordance with, the Animal Care and Ethics Committee (ACEC) of the Director-General of Industry and Investment NSW.

Field survey design was guided with consideration of the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004) and taxa specific guidelines for frogs (DECC 2009; DEWHA 2010b), birds (SEWP&C 2010) and microchiropteran bats (DEWHA 2010a).

The following sections provide the detail of the methodologies adopted for this assessment. A summary of fauna survey effort is provided (see **Table 6**).

6.1.1 Weather Conditions During Fauna Survey

Weather conditions during the field survey were considered conducive to detecting all fauna species including threatened fauna. Data from the closest weather station was sought (BOM 2016b) (Tenterfield (Federation Park), approximately 40 km north east of the Study Area) and is presented (see **Error! Reference source not found.**).

Table 5 Weather conditions during the field survey from the Tenterfield (Federation Park) Weather Station.

Date	Min Temp (degrees C)	Max Temp (degrees C)	Rainfall (mm)
26/09/15	1.5	16.9	0.8
27/09/15	4.5	18.4	9.2
28/09/15	3.4	18.4	0
29/09/15	3.4	21.3	0

6.1.2 Diurnal Birds

Surveys to determine the presence and usage of the Study Area by diurnal birds were conducted. These surveys were completed at 13 locations within the Study Area during the field survey (see **Map 6**) guided by a standardised technique (Watson 2003; 2004). Surveys were conducted in either the early morning or late afternoon to coincide with peak bird activity. Observers actively searched for diurnal birds and identified species by sight and by vocalisation during each 20 minute bird survey. Opportunistic data was also collected across during the field survey whenever traversing the Study Area.

6.1.3 Scat and Sign Searches

Ten Scat and Sign Searches were undertaken for 20 minutes in each vegetation type for the presence of diurnal and nocturnal fauna (see **Map 6**). In addition, any track and scat of interest observed during the field survey while undertaking other survey methods, was inspected. In the case of scats, identification was made using '*Tracks, Scats and Other Traces: A field guide to Australian Mammals*' (Triggs 2008). Scats which were unidentifiable in the field were sent away for further analysis by Barbara Triggs, the author of the book.

6.1.4 Echolocation Call Recording

Microchiropteran bats were targeted by using a 'Titley' Anabat SD1 hand-held detector for active monitoring. Data was collected at two locations over two nights, 27 and 28 September 2015 (**Map 6**). The use of Echolocation Call Recording Units is consistent with state and commonwealth guidelines for surveying microchiropteran bats.

All data collected from the Anabat SD1 were then analysed into bat and non-bat origin files. These files were then analysed using the software package AnalookW guided by the 'Bat Calls of New South Wales: Region based guide to echolocation calls of microchiropteran bats' (Pennay *et al.* 2004) and the EnviroKey reference call collection. It should be noted that members of the *Nyctophilus* genus were unable to be identified to species level due to a lack of differentiation between species and are identified to genus level only. Anabat analysis was conducted by Principal Ecologist Steve Sass.

A call was defined as a sequence of three or more consecutive pulses of similar frequency. Due to variability in the quality of calls and the difficulty in distinguishing some species the identification of each call was assigned a confidence rating as follows:

D = Definite: Species identification not in doubt.

PR = Probable: Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call types.

PO = Possible: Call characteristics are comparable with the species, but there exists a reasonable probability of confusion with one or more bat similar species or the quality or length of call prohibits a confident identification.

Those calls unable to be identified due to poor call quality resulting in a lack of diagnostic features were assigned 'Unidentifiable'.

6.1.5 Motion Activated Infrared Cameras

Motion-activated Infrared cameras are well known for their efficiency in detecting fauna species without the need to set traditional traps (Claridge *et al.* 2004). RECONYX PC900 HyperFire Professional High Output motion-activated infrared cameras were activated at four locations within the Study Area (see **Map 6**). Cameras were set on high sensitivity with five images captured per motion detected. Cameras were pointed to a bait station containing a chicken wing (a known attractant for terrestrial mammals such as quolls). Two cameras were activated at four sites over three nights, 26 – 28 September 2015 at one site then moved to a new site on 28 September 2015, resulting in a survey effort of 6 camera nights.

6.1.6 Call Playback

Call playback was conducted to target nocturnal fauna. The target species for this assessment were the Masked Owl, Barking Owl, Bush Stone Curlew, Powerful Owl and all nocturnal fauna. Call playback was undertaken at three sites within the Study Area over two nights on 27 and 28 September 2015 (see **Map 6**).

At each location, the Call playback survey commenced with an initial listening period of 10 minutes. The call of a target species was then transmitted intermittently over a period of two minutes, following by a two minute listening period.

6.1.7 Spotlighting

Spotlighting was undertaken using a hand-held 50W spotlight by two persons at the conclusion of each call playback survey location for a period of 40 minutes. A total of three transects were completed. In addition, vehicular spotlighting was also conducted while travelling across the Study Area during nocturnal surveys. All survey locations across the Study Area are provided (see **Map 6**).

6.1.8 Herpetofauna Search

Six herpetofauna searches were conducted at each habitat type (see **Map 6**). Each site was systematically searched by an experienced ecologist in a 100m x 50m area for active and inactive animals. Fallen timber, loose bark, tree and ground hollows, and loose soil were extensively searched (Blomberg and Shine 1996).

6.1.9 Habitat Assessment

Qualitative habitat assessments were undertaken to develop an understanding of the extent and conditions of habitats with the Study Area. This assists in our analysis of the likelihood of occurrence of threatened and migratory species. Additionally, visual searches for scats, diggings, footprints and other fauna signs were also completed.

Fauna habitat condition and approximate extent within the Study Area was mapped as being in good, moderate or poor condition. Habitat condition was determined through the habitat surveys using factors such as the availability of microhabitat including fallen timber and mistletoe, amount of exotic vegetation, the presence of tree hollows and any threatened species records collected during the survey. Also taken into consideration was the known habitat requirements of the threatened species. The following rankings was assigned relative to each other with consideration (but not necessarily all) of the following attributes:

Good

- Patch size large.
- Abundant trees hollows present
- Habitat is well connected to other areas of habitat
- Good quantities of fallen timber, mistletoe, leaf litter and other microhabitat.
- Contains levels of habitat that are likely to supporting breeding and/or roosting opportunities for threatened species that are known to, or are likely to occur in the study area.

- Threatened species are known to occur there from this survey, previous records or author's knowledge.

Moderate

- Patch size moderately sized and/or tree density remains sparse.
- Some trees hollows present.
- Some fallen timber, mistletoe, leaf litter and other microhabitat.
- Habitat has some connectivity to surrounding habitat.
- Contains levels of habitat that may support breeding and/or roosting opportunities for threatened species that are known to, or are likely to occur in the study area.
- Threatened species may occur within this habitat.

Poor

- Patch size small and/or tree density within patch sparse.
- Virtually no trees hollows present.
- Virtually no fallen timber, mistletoe, leaf litter and other microhabitat.
- Habitat has little connectivity to surrounding areas.
- Contains virtually no habitat that would support breeding and/or roosting opportunities for threatened species that are known to, or are likely to occur in the study area.
- Unlikely to support threatened species on a permanent basis. Fauna habitat maps would be produced noting any features of significance to threatened fauna, the extent and condition of fauna habitats and the location of any threatened fauna species if recorded.

6.1.10 Total Survey Effort

A summary of the total survey effort conducted during the field survey is provided (see **Error! Reference source not found.**). This survey effort was guided by the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft)(DEC 2004) with consideration of the size of the Study Area and the vegetation communities and fauna habitats present (see **Map 6**). The diverse range of survey methods used in this study and the survey effort conducted confirms that overall, this assessment is consistent with OEH guidelines.

Table 6 A summary of fauna survey type, effort and target fauna conducted for this assessment.

Survey Type	Total Survey Effort
Diurnal Birds	13 locations for 20 minutes each. Total survey effort was 260 minutes.
Scat and Sign Search	10 searches at the vegetation types for 20 minutes each. Total survey effort 120 minutes.
Echolocation Call Recording	Two locations over two nights, 20 minutes at each site totaling 40minutes. Mobile monitoring over two transects with a total survey effort of 80 recording minutes.
Motion Activated Infrared Cameras	Four sites over 3 nights resulting in 6 camera nights.

Survey Type	Total Survey Effort
Call Playback	Three sites over two nights.
Spotlighting	Three sites were surveyed over 2 nights. Each survey was completed in 40 minutes by two people. Total survey effort was 240 minutes over three nights.
Herpetofauna Search	6 sites in total for 20 minutes each. Total survey effort 200 person minutes.
Habitat Assessment	Generally while traversing the Study Area.

6.1.11 Nomenclature

Nomenclature used within this report follows Morcombe (2004) for birds, Menkhorst & Knight (2010) for mammals (except bats) and for bats, Churchill (2008). For frogs, the latest field guide is used (Tyler and Knight 2009) and for reptiles, the field guide to the reptiles of NSW (Swan *et al.* 2004) with modifications due to recent taxonomic revisions where required (Sass 2011a; b; Swan 2013). Where no common name is provided with these texts, a generally accepted name is used.

6.1.12 Limitations

While this study was completed during Spring 2015 when field conditions were conducive to detecting many of the fauna that are known to occur in the area, a common limitation of many ecological studies is the short period of time in which they are conducted. When combined with a lack of seasonal sampling this can lead to either low detection rates or false absences being reported. This is also particularly relevant to highly mobile species that may not have been in the Study Area at the time of the survey. For these reasons, it should be recognised that it may be impossible to rule out species absence for some species during field surveys. Further analysis of the potential for species presence based on available habitats occurs within **Chapter 9**.

6.2 RESULTS

The field surveys within the Study Area have revealed a total of 70 fauna species comprising:

- 52 species of bird
- Two species of reptile
- Six species of frog
- 10 species of mammal (including one species of microchiropteran bat).

A full species list is provided in **Appendix 5**.

6.2.1 Threatened and Migratory Fauna

A total of five threatened or migratory fauna species were identified within the Study Area. These were the:

- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*), Vulnerable TSC Act
- Hooded Robin (*Melanodryas cucullata*), Vulnerable TSC Act

- Rufous Fantail (*Rhipidura rufifrons*), Migratory EPBC Act
- Scarlet Robin (*Petroica boodang*), Vulnerable TSC Act
- Varied Sittella (*Daphoenositta chrysoptera*), Vulnerable TSC Act

All species were recorded as opportunistic sightings. The Varied Sittella was also recorded during bird survey six (see **Map 6**).

The spatial locations of all threatened and migratory fauna species is provided (see **Map 7**).

6.2.2 Avifauna

Fifty-two bird species were recorded during the field survey. This compares to 45 species recorded on Bionet for the Torrington State Forest (OEH 2016b). However 135 bird species have been recorded in the adjoining Torrington State Conservation Area (NPWS 2003b). This may be due to the relatively short survey period undertaken and a higher amount of surveys undertaken in the adjoining SCA over an extended period of time. The assemblage of birds recorded during this study is considered typical of Open Forest in NSW and consistent with previous surveys (Pratt 1999). Birds commonly recorded included Eastern Spinebill, Grey Fantail, Spotted Pardalote, Yellow-faced Honeyeater and White-throated treecreeper (**Appendix 5**). Four threatened species under the TSC Act were recorded Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*), Hooded Robin (*Melanodryas cucullata*), Scarlet Robin (*Petroica boodang*) and Varied Sittella (*Daphoenositta chrysoptera*). One migratory species listed under the EPBC Act 1999 was detected, Rufous Fantail (*Rhipidura rufifrons*).

6.2.3 Mammals (excluding microchiropteran bats)

Ten species of mammal were recorded within the Study Area (**Appendix 5**). The most commonly recorded being Eastern Grey Kangaroo and Red-necked Wallaby. Three were introduced species Red Fox, Pig and Rabbit, all considered key threatening processes to native biodiversity (i.e., Red Foxes predating on native fauna, Pigs and Rabbits degrading native vegetation and compromising habitat quality). A search using Bionet revealed 18 mammal species previously recorded in the Torrington State Forest while the Torrington SCA Plan of Management shows 21 mammal species have been recorded (NPWS 2003a). As well as the field survey being relatively short in duration, trapping was not conducted and provides a likely explanation as to the notable absence of many mammal species. The presence of introduced species (predators and competitors) may also be a contributing factor.

No threatened mammal species were recorded.

6.2.4 Microchiropteran bats

Due to equipment failure in the field, no microchiropteran bat species were recorded using the Anabat SD1 detector. One audible bat species was identified and recorded that being the White-striped Free-tail Bat. Six species of microchiropteran bat species have been recorded previously in the Torrington State Forest (Bionet 2016). Regardless of the equipment failure, all threatened species of microchiropteran bat are considered further with regard to potential presence based on habitat and previous records (**Chapter 9**).

6.2.5 Reptiles

Reptile species richness is considered low with two species recorded within the Study Area (**Appendix 5**). Six species of reptile have been recorded in Torrington State Forest while 29 species have been recorded in the adjoining SCA. Notable absences within the reptile fauna were elapids which can be notoriously difficult to detect. Lack of species detected could be a result of the duration, weather and timing of field surveys.

No threatened reptile species were recorded and none are expected to occur here given the absence of suitable habitat.

6.2.6 Frogs

Frog diversity is considered relatively high with six species detected during the field survey (**Appendix 5**). Many species were recorded within the vicinity of water sources. A number of other frog species are also likely to occur within the Study Area, but the absence of heavy rain immediately prior to or during the field survey was likely the reason for their non-detection. A recent search on Bionet showed three species of frogs had been recorded for Torrington State forest while 13 species have been detected in the adjoining Torrington SCA (NPWS 2003a).

No threatened frog species were recorded and none are expected to occur here given the absence of suitable habitat.

6.2.7 Habitat Assessment

One general fauna habitat is present within the Study Area; Woodland/Forest vegetation (see **Map 7**). Habitat condition is considered Good across the Study Area.

Table 7 shows the extent of fauna habitats in the Study Area.

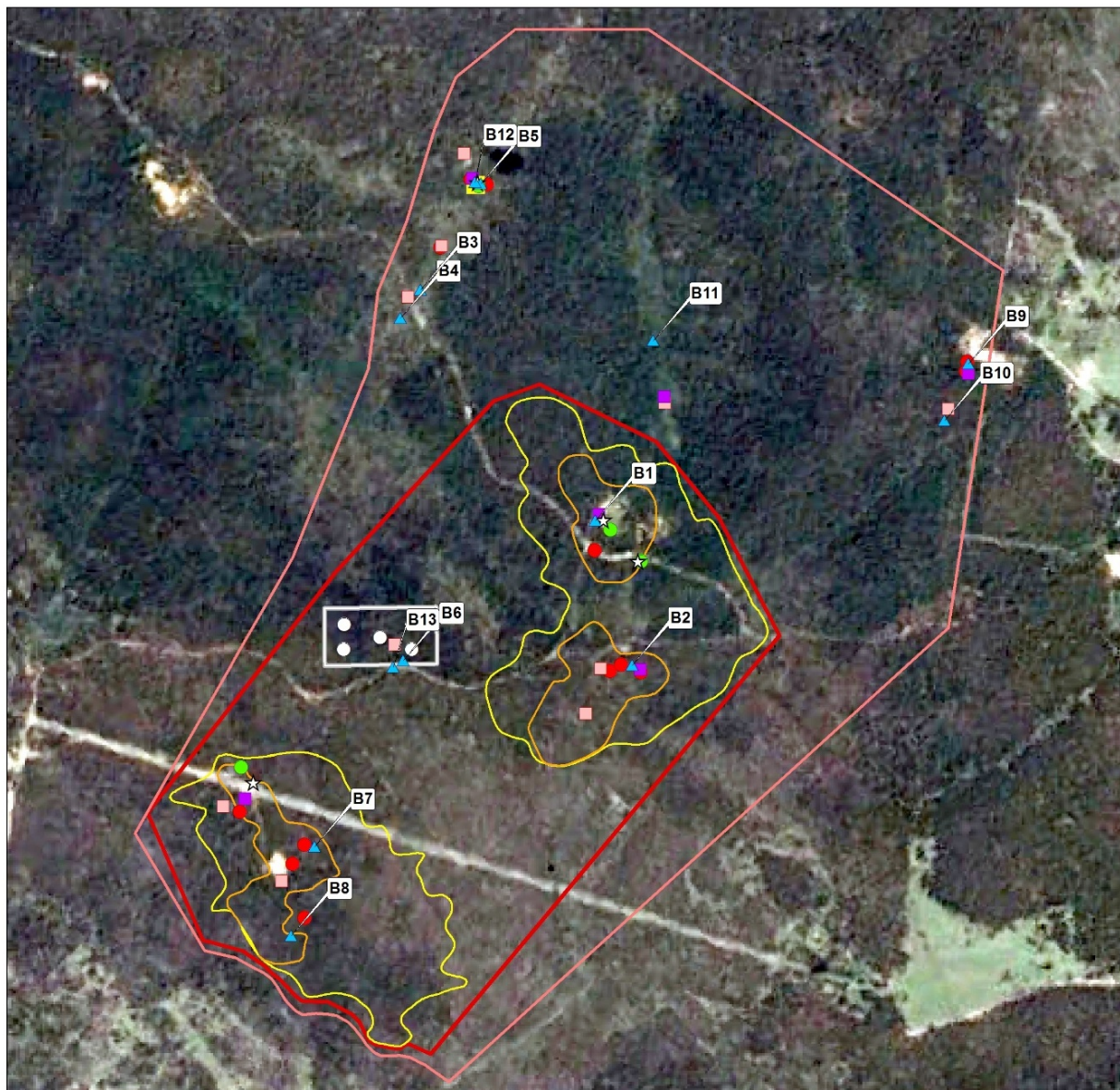
Table 7 Extent of Fauna habitats across the Study Area.

Habitat type	Area (ha)	Extent of area within the Project area (ha)
Woodland/Forest	291.70	132.31

6.2.8 Corridors and Connectivity

The general landscape has been significantly compromised by previous large-scale land clearing for agricultural purposes. However, Torrington State Conservation Area (30,030 hectares) (NPWS 2003a) borders the Study Area to the north, east and west and provides a potentially significant habitat refuge for flora and fauna. Beyond that, there are patchy corridors that eventually link up to other National Parks, Nature Reserves and State Forests about 40km away. Given the size of the Study Area and the proximity of Torrington SCA and the remaining area of Torrington State Forest, it could be considered an important landscape patch linking and supporting the areas surrounding it. These remaining remnants are likely to significantly

contribute to landscape connectivity as they would be strongly contributing to genetic exchange and the movement of individuals across this fragmented landscape.



Legend

- | | |
|-------------------------------------|----------------------------------|
| ○ Proposed Sterilisation Drill Hole | |
| ▭ Processing Area | ▭ Study Area |
| ▭ Primary Resource Target Area | ▭ REF Area |
| ▭ Secondary Resource Target Area | |
| Fauna Surveys | |
| ▲ Bird | ☆ Call Playback |
| ● Frog Spot Survey | ■ Herp |
| ■ Nocturnal | ● Terrestrial Habitat Assessment |
| ■ Scat and Sign | |

Map datum, projection: GDA 1994, MGA Zone 56

Data Sources:
 Fauna Survey Locations: Envirokey
 Area of Interest: RW Corkery and Co.
 Aerial: Google Earth

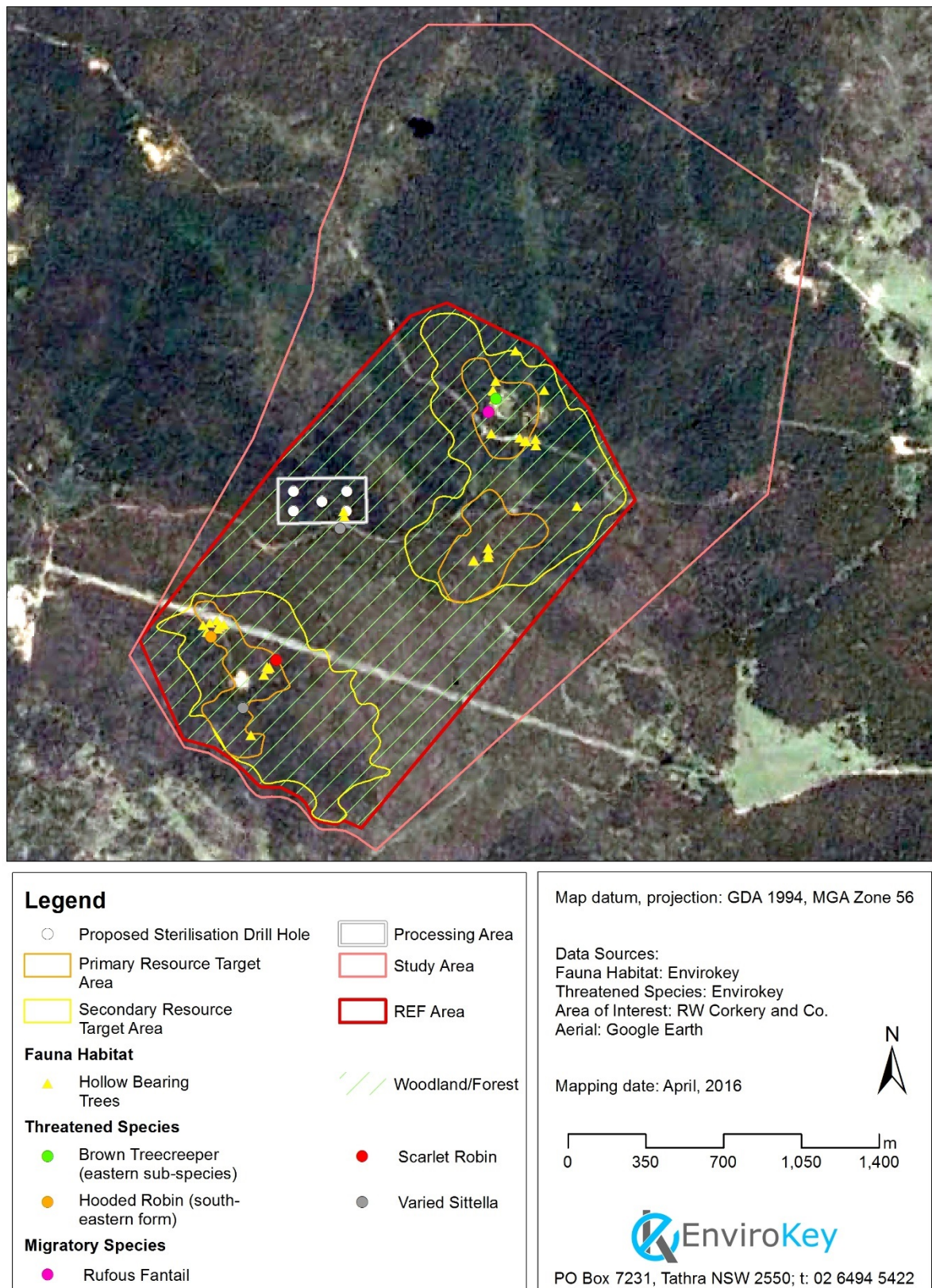
Mapping date: April, 2016

0 0.35 0.7 1.05 1.4 km



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Map 6 Location of Fauna Surveys across the Study Area



Map 7 Fauna Habitats and locations of threatened species recorded during surveys.

7 POTENTIAL IMPACTS

The construction and operation of mining projects can have a range of potential impacts to biodiversity. The potential impacts as a result of the Project are summarised below and in the following sections. These include:

- Loss of native vegetation including threatened flora habitat.
- Loss of fauna habitats.
- Direct mortality of protected and threatened fauna.
- Loss of connectivity through the degradation of wildlife and habitat corridors.
- Invasion and spread of weeds and pest fauna species.
- Edge effects from noise, vibration and light.
- Introduction or increased exposure to key threatening processes that may affect terrestrial and aquatic species, populations, ecological communities and their habitat (including threatened biota).
- Regional cumulative impacts affecting the long-term viability and survival of common and threatened species, populations and ecological communities and their habitats.

The Proposed activity would involve the use of reverse circulation percussion (RCP) and diamond core drilling (DC) with the purpose of:

- further develop the geological understanding of the Mt Everard and Wild Kate/Burnt Hut Identification Areas, with a view to preparing an updated Joint Ore Reserves Committee (JORC) Code-compliant resource estimate statement;
- increasing the existing 2012 JORC Code-compliant resource from approximately 5,000 tonnes to between 10,000 tonnes and 15,000 tonnes of WO₃ (tungsten oxide); and
- undertaking sterilisation drilling of potential infrastructure areas, in particular the potential processing area.

The drilling schedule would be undertaken in three Phases. Each phase is determined by the results and success of the previous phase. Phases are most likely to occur concurrently and indicatively would, as a maximum, be as follows (all distances are approximate):

Phase 1:

- Drill holes 50m apart
- Transect lines 50m apart
- Total length 5.6km.

Phase 2:

- Extending on from Phase 1 transect lines and/or the construction of additional transect lines adjacent to Phase 1 transect lines
- Drill holes 50m or 100 m apart
- Transect lines spaced up to approximately 200m apart
- A total of 8.1km of additional transect lines would be constructed if all are completed.

Phase 3:

- Extending on from Phase 2 transect lines and additional transect lines
- Drill holes 50m or 100m apart
- Transect lines 50m apart
- Possible holes on previously constructed transect lines at 25m depending on JORC codes resource estimate
- A total of 9.8km of additional transect lines would be constructed if all are completed.

An additional five sterilization holes will be drilled at the Potential Processing Plant Area.

The estimated duration of the Project is three to four months.

7.1 LOSS OF VEGETATION AND HABITAT

Clearing of native vegetation is a key threatening process listed under the TSC Act and the EPBC Act. The Project would result in the clearing of approximately 8.39 hectares. This equates to approximately 2.9% of the Project area or 1.2% of the Study Area or 0.02% of the total area including the adjoining Torrington SCA.

These estimates have been calculated based on the footprint of the Project by R.W. Corkery & Co. PTY Limited (RWC). No additional clearing is required for access or infrastructure. No additional clearing is expected for ancillary facilities.

The maximum area of disturbance is based on the following activities and time frame:

- Up to 600 drill sites at 42m² per site = 2.52 hectares.
- 23.5km of transect lines at 2.5m wide = 5.87 hectares.

Disturbance areas may be classified as follows.

- Class 1 - Open areas requiring no mechanical clearing – approximately 40% or 3.36 hectares.
- Class 2 - Open areas requiring mechanical movement of fallen timber – approximately 20% or 1.67 hectares.
- Class 3 – Remaining areas requiring mechanical clearing of standing vegetation – approximately 40% or 3.36 hectares.

Table 8 details the extent of vegetation loss caused by the Project at each BVT. **Map 8** shows the extent and location of each drill transect within each vegetation type.

Table 8 Summary of vegetation loss for the Project by Biometric vegetation type and area

Biometric Vegetation Type	Direct loss (hectares)
BVT BR122: Broad-leaved Stringybark -	4.58

Mountain Gum - Apple Box open forest of the New England Tablelands	
BVT BR213 Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands	3.54
BVT BR116 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands	0.27

7.1.1 Threatened Ecological Communities

One threatened ecological community (TEC), BR116: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands, as listed by the TSC Act and EPBC Act was recorded within the Study Area. Approximately 0.27 hectares of this TEC would be affected. Crews undertaking work will be suitably trained to identify this TEC before any drilling takes place. Where possible, trees with a diameter at breast height (DBH) of 20cm or greater or taller than two metres will remain.

7.1.2 Threatened Species Habitat

Field surveys to date have identified that the Study Area is utilised by threatened fauna from time to time. All species (with the exception of Varied Sittella) are highly mobile species that forage over large areas, and are unlikely to be confined to the boundaries of the Study Area, or in some instances, the locality.

For the Varied Sittella, these are highly sedentary with small home ranges varying between 13 – 20 hectares and the species is dependent on complex microhabitat resources (Noske 1998). The presence of this species during field surveys confirms that despite the regrowth nature of the vegetation within the study area, habitat for threatened biota is present.

7.1.3 Hollow-bearing Trees

Based on the results of the field surveys, hollow bearing trees are relatively common. Of the 42 HBT's mapped, 13 were 'stags' and the remaining are Eucalyptus species. A total of 133 individual hollows or crevices were recorded. Loss of hollow-bearing trees is listed as a Key Threatening Process by the TSC Act. No Hollow-bearing trees will be removed for the Project, instead access tracks will be prepared specifically avoiding, where possible, the removal of any tree with a DBH greater than 20cm. Where possible, trees taller than two metres within BVT BR116 will also remain.

7.2 WILDLIFE CONNECTIVITY AND HABITAT FRAGMENTATION

Levels of connectivity and habitat fragmentation can vary at both landscape and patch scale (Lindenmayer and Fischer 2006). Relevant to the Project and the existing environment, levels of connectivity would be partially indirectly impacted given the relatively low disturbance of the Proposed Disturbance Footprint. Trees greater than 20cm in diameter at breast height will, where possible, not be removed and natural revegetation proposed by the Company as part of rehabilitation, would happen progressively throughout the drilling schedule and on completion to improve any disturbed area and retain connectivity throughout the Study Area.

7.3 WEEDS

A total of three weed species were recorded from field surveys within the Study Area. None of which are declared noxious as declared by the NSW DPI Noxious Weeds list for the Tenterfield LGA (DPI 2015) (see **Appendix 3**).

7.4 PESTS AND PATHOGENS

Red foxes, Pigs, Rabbits, Cat, Goat, Dog, Deer and Cane Toad are all known from the locality and some of these have been recorded in the Study Area, or if absent, are likely to occur based on the presence of habitat. For the locality, eight key threatening processes (KTP) as listed by the TSC Act and six listed by the EPBC Act relate to the invasion and establishment of these species. The TSC Act KTP relating to these introduced species are listed as follows:

- Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- Herbivory and environmental degradation caused by feral deer
- Predation by the European red fox (*Vulpes vulpes*)
- Competition and habitat degradation by feral goats (*Capra hircus*)
- Invasion and establishment of the cane toad (*Bufo marinus*)
- Predation by the feral cat (*Felis catus*)
- Predation and hybridisation of feral dogs (*Canis lupus familiaris*)
- Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)

The EPBC Act KTP relating to these introduced species are listed as follows:

- Competition and land degradation by rabbits.
- Predation by European red fox.
- Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs.
- Competition and land degradation by unmanaged goats
- Predation by feral cats
- The biological effects, including lethal toxic ingestion, caused by Cane Toads (*Bufo marinus*)

The Project may exacerbate some processes for some species given that vehicle access routes would be prepared and that Red Foxes, Cats and Rabbits are known to use roads as a vector for dispersal in vegetated areas. KTP are considered further in section 7.7.

Pathogens result in disease in flora and fauna and can be found living in organisms such as fungus, bacteria and viruses. Two pathogens are known from NSW and these are also listed as KTP. These being:

- Dieback caused by Phytophthora (TSC Act and EPBC Act).
- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis (TSC Act and EPBC Act).

7.5 GROUNDWATER DEPENDENT ECOSYSTEMS

The Project is unlikely to result in a significant reduction in both the water flow and water table height given the absence of groundwater dependent habitats.

7.6 NOISE, VIBRATION AND LIGHT

Noise and vibration are likely to result from the Project. It is not anticipated that operation noise and vibration would have a significant effect based on previous studies at the Tritton Mine and Girilambone Copper Mine where threatened species have been recorded foraging and breeding directly adjacent to current operations (EnviroKey 2010; 2011a; b; c).

Light has the potential to disturb sleeping activity for diurnal fauna and foraging activity for nocturnal fauna. Light is unlikely to impact fauna as the works will be carried out in daylight hours.

7.7 IMPACT ON RELEVANT KEY THREATENING PROCESSES

Key threatening processes are listed under the TSC Act and EPBC Act that have the potential to either:

- Adversely affect threatened species, populations or ecological communities; or
- Causes common species, populations or ecological communities to become threatened.

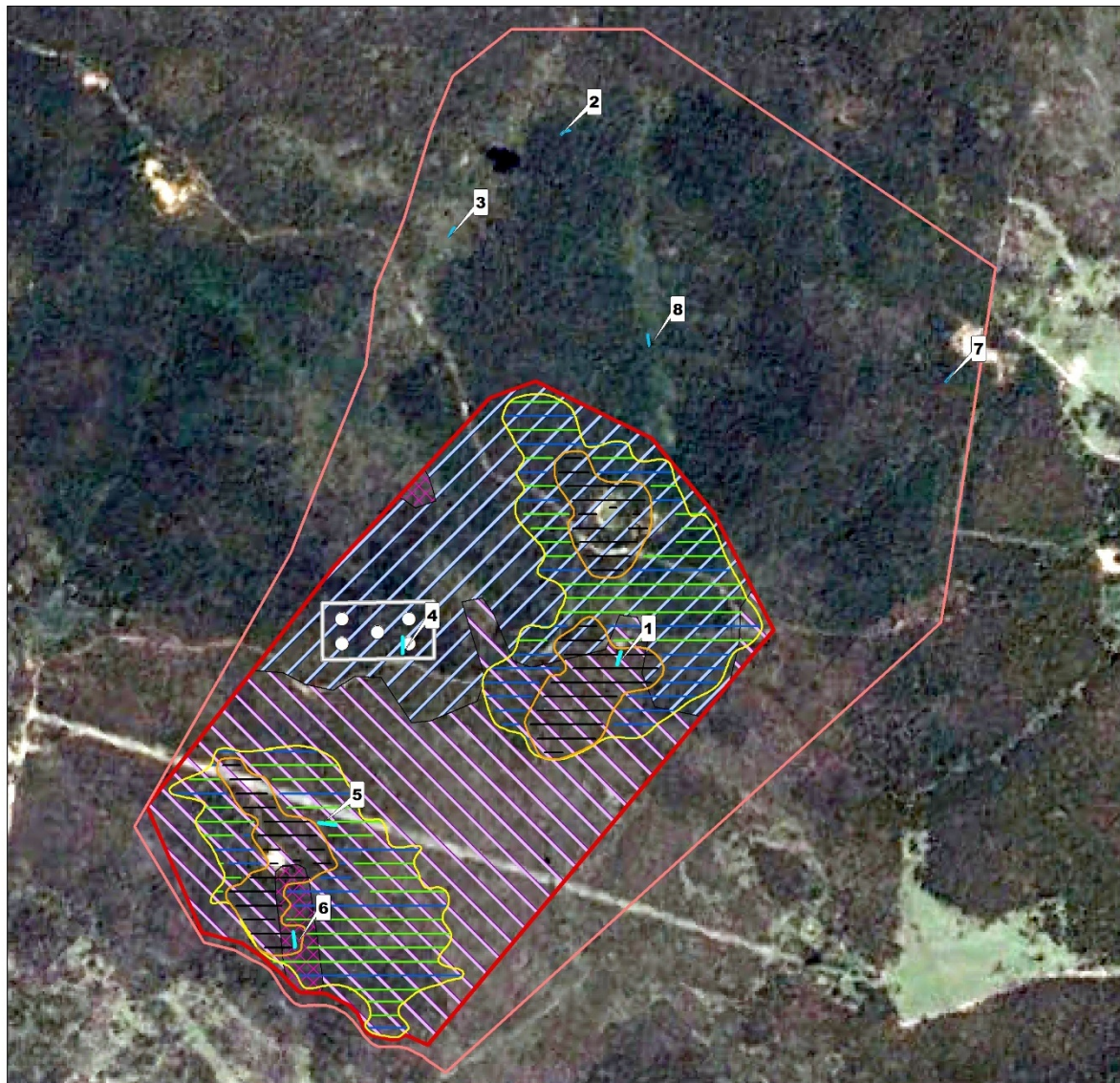
There are a number of listed key threatening processes that are of relevance to aspects of the Project. These are provided in summary in **Table 9**.

Table 9 Key threatening processes relevant to the Project

Key threatening process	Listed Act	Type of threat	Potential impacts
Clearing of native vegetation	TSC Act EPBC Act	Habitat loss/change	The Project would result in the clearing of about 8.39 hectares of native vegetation.
Infection of native plants by <i>Phytophthora cinnamom</i>	TSC Act EPBC Act	Pathogen	Infected root material can be dispersed by earth moving equipment and other vehicles.
Increased sedimentation and erosion during construction	FM Act	Habitat loss/change	There is some potential for increased sediment to reach minor drainage as a result of the clearing and drilling required for the Project. However, this is dramatically reduced given that a silt stop fence would be installed along with other control measures in accordance with <i>Managing Urban Stormwater</i> . Existing tracks will also be utilised where ever possible.

7.8 CUMULATIVE IMPACTS

There are no other Projects for development within Torrington State Forest or within the Study Area that we are aware of. Therefore the Project is unlikely to contribute to a cumulative impact to the local biodiversity given the size and development type of the Project.



Legend

- Proposed Sterilisation Drill Hole
 - Phase 1 Drill Line
 - Phase 2 Drill Line
 - Phase 3 Drill Line
 - Biobanking Transect
 - Primary Resource Target Area
 - Secondary Resource Target Area
 - Processing Area
 - Study Area
 - REF Area
- Vegetation**
- BR116: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands
 - BR122: Broad-leaved Stringybark - Mountain Gum - Apple Box open forest of the New England Tablelands
 - BR213: Silvertop Stringybark - Round-leaved Gum shrubby open forest in the Torrington area of the New England Tablelands

Map datum, projection: GDA 1994, MGA Zone 56

Data Sources:
 Biobanking Transect: Envirokey
 Vegetation Communities: Envirokey
 Area of Interest: RW Corkery and Co.
 Aerial: Google Earth

Mapping date: April, 2016

0 0.35 0.7 1.05 1.4 km



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Map 8 Location and extent of drill transect lines across each vegetation type.

8 PROPOSED AMELIORATION MEASURES

Given the nature and extent of the Project, the amelioration measures should include the following:

- General land management amelioration measures (eg, pest animal control).
- Amelioration measures to be undertaken prior to commencement of the Project (eg, pre-clearance surveys).
- Amelioration measures to be undertaken during the Project (eg, clearly marking areas to be cleared and areas to be retained).
- Amelioration measures to be undertaken after the proposed activity has been completed (eg, rehabilitation, monitoring).

Amelioration measures detailed below should be fully implemented to ensure that no '*significant effect*' would occur upon any threatened or migratory biota or their habitats that are known to, or potentially occur within the Study Area. These measures would also ensure that any potential impacts upon other non-threatened flora, vegetation communities, fauna and their habitats would also be minimised.

8.1 AMELIORATION MEASURES TO BE UNDERTAKEN DURING THE PROJECT

A range of amelioration measures are proposed that should be undertaken during the course of the Project:

- Transect lines are to be clearly marked with flagging tape to guide equipment through the best route.
- Vegetation must be clearly marked with flagging tape to ensure no accidental clearing occurs with special attention to TEC BVT BR116: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands. Within this BVT, and where possible, trees greater than two metres in height or have a DBH greater than 20cm are to remain.
- A suitably qualified person should inspect proposed areas of disturbance for threatened flora species after the disturbance areas have been marked up but prior to the commencement of drilling.
- In the event of a threatened flora species detected, the transect or drill hole would be moved to a location as close as possible but outside the growth area of the species.
- Any machinery required for the Project should be cleaned of all soil material prior to arriving on site and should remain on vehicular access tracks or within cleared or defined transects. When no track is available, machinery should be maneuvered to avoid saplings or canopy trees wherever possible.
- Transects are to be of a minimal width that would safely allow vehicle access. The Company has indicated that this would be approximately 2.5 metres.
- Where trees are to be removed, they are to be no greater than a DBH of 20cm, where possible, and any trees/limbs should be placed in adjacent vegetation improving existing habitats.

- Each tree identified for removal should be checked for any fauna species, in particular Koala and Grey-headed Flying Fox.
- Any noxious weed and other weed material encountered should be destroyed and/or removed from the site using appropriate methods to ensure weeds do not spread into the remainder of the Study Area.
- Sediment and erosion control structures should be installed where deemed appropriate.
- Vehicles and machinery would maintain a slow speed so as to avoid contact and potential injury to disturbed fauna.
- Exposed surface soil should be stabilised as soon as possible to avoid potential erosion.

8.2 AMELIORATION MEASURES TO BE UNDERTAKEN AT THE COMPLETION OF THE PROPOSED ACTIVITY

At the completion of the Project, a series of rehabilitation and monitoring measures should be implemented within the framework of a Rehabilitation Plan:

- Emphasis should be placed on rehabilitating cleared areas with native species removed as a result of the clearing process. Rehabilitation could include the use of cleared vegetation and the naturally occurring seed bank from redistributed topsoil.
- Exposed surface soil should be stabilised as soon as possible to avoid potential erosion (through the use of soil binding agents or by mulching, covering or replanting with native species).
- Rehabilitation of the Project area should be monitored to ensure native vegetation regeneration is successful (e.g. permanent photo locations should be established to gauge germination success) and to control weed invasion.

9 THREATENED AND MIGRATORY BIOTA EVALUATION

9.1 METHODS

When evaluating which threatened and migratory biota are likely to occur within the Study Area, the following factors were taken into consideration:

- The presence of potential habitat
- Condition of and approximate extent of potential habitat
- Species occurrence within Study Area and wider locality
- Results of previous surveys within the Study Area and wider locality
- Knowledge and experience of the Principal Ecologist

The following sources of data identify a number of threatened biota known to, or predicted to occur in the locality:

- OEH Atlas of NSW Wildlife (which includes flora records) using a 10 kilometre radius of the Study Area as the search area (OEH 2016b) (29 March 2016)
- OEH Threatened Species Predictor database using the Binghi Plateaux sub-region of the Border Rivers-Gwydir CMA as the search parameter (OEH 2016c) (22 September 2015)
- EPBC Act Protected Matters Reporting Tool using a 10 kilometre buffer of the Study Area (DotE 2016) (22 March 2016).

The following criteria were applied to each entity based on the above:

- No (no suitable habitat within the Study Area and the species not previously recorded within the locality; or in the case of flora, Study Area extensively searched during the appropriate time of year for detection and species not present).
- Unlikely (no suitable habitat is present, species has limited dispersal capability but previously recorded within the locality).
- Possible (suitable habitat within the Study Area and the species known from the locality; or no suitable habitat present but the species is regarded as highly nomadic or has a high dispersal capability).
- Yes (recorded during the field survey).

9.2 RESULTS

Of the threatened and migratory biota compiled from the results of the field survey and the sources of data detailed within **Section 9.1**, **Table 10** identifies that 30 threatened species and two migratory species were found to occur or possibly occur within the Study Area. Given this likelihood of occurrence, there may be some potential for these species to be impacted by the Project.

Table 10 Evaluation of the likelihood of threatened and migratory biota occurring within the Study Area.

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
AVIFAUNA				
Australian Painted Snipe <i>Rostratula australis</i> E TSC V EPBC M EPBC	Inhabits inland and coastal shallow freshwater wetlands, occurring in both ephemeral and permanent wetlands with grass. Generally only seen as a single bird. The breeding wetland areas are the most sensitive to this species.	No	No	No
Barking Owl <i>Ninox connivens</i> V TSC	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 ha, with 2000 ha being more typical in NSW habitats. In western NSW, this species is largely confined to riparian areas where suitable habitat also occurs.	No	Yes	Possible
Black-chinned Honeyeater (eastern sub-species) <i>Melithreptus gularis gularis</i> V TSC	This species occupies the upper levels of drier open forest or woodland dominated by Box and Ironbark especially Mugga Ironbark, White Box, Inland Grey Box and Forest Red Gum. Forests of smooth bark, stringybark, ironbark and tea trees are also known to be used. Their feeding territories can be large, up to 5 ha in area	No	Yes	Possible
Black Falcon <i>Falco subniger</i> V TSC	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be preferable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres.	No	No	No
Brown Treecreeper (eastern sub-species) <i>Climacteris</i>	Occupies eucalypt woodlands through central NSW and in coastal areas with drier open woodlands. Sedentary, considered to be resident in many locations throughout its range. Found in eucalypt woodlands (including Box-Gum	Yes	Yes	Yes

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
<i>picumnus victoriae</i> V TSC	Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>). fallen timber is an important habitat component for foraging			
Black-faced Monarch <i>Monarcha melanopsis</i> M EPBC	They are found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	No	No	Unlikely
Cattle Egret <i>Ardea ibis</i> M EPBC	Found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock.	No	No	No
Diamond Firetail <i>Stagonopleura guttata</i> V TSC	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	No	No	Unlikely
Flame Robin <i>Petroica phoenicea</i> V TSC	The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes.	No	No	Unlikely
Fork-tailed Swift <i>Apus pacificus</i> M EPBC	The Fork-tailed Swift mostly occurs over inland plains, but can sometimes be found in coastal areas. The species is found over dry and open habitats, including riparian woodlands and tea tress swamps, low scrub, heathland or saltmarsh.	No	No	Unlikely

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
Glossy Black-cockatoo <i>Calyptorhynchus lathami</i> V TSC	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur.	No	Yes	Unlikely
Great Egret <i>Ardea alba</i> M EPBC	Prefers shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	No	No	No
Hooded Robin (south-eastern form) <i>Melanodryas cucullata cucullata</i> V TSC	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Yes	Yes	Yes
Latham's Snipe <i>Gallinago hardwickii</i> M EPBC	Latham's Snipe are seen in small groups or singly in freshwater wetlands generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. The species is also known to use crops and pasture.	No	No	No
Little Eagle <i>Hieraaetus morphnoides</i> V TSC	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	No	No	No
Little Lorikeet <i>Glossopsitta pusilla</i> V TSC	Distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. Forages primarily in the canopy of open <i>Eucalyptus</i> forest and woodland, yet also finds food in <i>Angophora</i> , <i>Melaleuca</i> and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	No	Yes	Unlikely
Masked Owl <i>Tyto novaehollandiae</i> V TSC	Pairs have a large home-range of 500 to 1000 ha. Lives in dry eucalypt forests and woodlands from sea level to 1100m. A forest owl, but often hunts along the edges of forests, including roadsides.	No	No	Unlikely

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
Osprey <i>Pandion haliaetus</i> M EPBC	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia.	No	No	No
Painted Honeyeater <i>Grantiella picta</i> V TSC	Inhabits Myall, Brigalow, Box-Gum Woodlands and Box-ironbark Forests and is a specialist mistletoe feeder.	No	No	Unlikely
Powerful Owl <i>Ninox strenua</i> V TSC	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range. Inhabiting a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.	No	Yes	Possible
Rainbow Bee-eater <i>Merops ornatus</i> M EPBC	Most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It can be found on farmlands and the species will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels.	No	Yes	Possible
Red Goshawk <i>Erythrorhynchus radiatus</i> V EPBC	In NSW favoured habitat is mixed subtropical rainforest and Melaleuca forest along coastal rivers, often in rugged terrain. Habitat has to be open enough for fast attack and manoeuvring in flight, but provide cover for ambushing of prey.	No	No	No
Regent Honeyeater <i>Anthochaera phrygia</i> CE TSC CE EPBC	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of	No	No	Unlikely

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
	mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany			
Rufous Fantail <i>Rhipidura rufifrons</i> M EPBC	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (<i>Eucalyptus microcorys</i>), Mountain Grey Gum (<i>E. cypellocarpa</i>), Narrow-leaved Peppermint (<i>E. radiata</i>), Mountain Ash (<i>E. regnans</i>), Alpine Ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red Mahogany (<i>E. resinifera</i>); usually with a dense shrubby understorey often including ferns.	Yes	No	Yes
Satin Flycatcher <i>Myiagra cyanoleuca</i> M EPBC	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, <i>Myiagra rebecula</i> , often occurring in gullies.	No	No	No
Scarlet Robin <i>Petroica boodang</i> V TSC	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Fallen timber and logs are important habitat features.	Yes	Yes	Yes
Speckled Warbler <i>Pyrholaemus sagittatus</i> V TSC	The Speckled Warbler lives in a wide range of Eucalyptus dominated woodland communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some Eucalypt regrowth and an open canopy. Large, relatively undisturbed woodland remnants are required for the species to persist in an area.	No	No	Unlikely
Square-tailed Kite <i>Lophoictinia isura</i> V TSC	Found in a variety of timbered habitats including woodlands and open forests with a particular preference for timbered watercourses.	No	Yes	Unlikely
Squatter Pigeon <i>Geophaps scripta scripta</i>	Squatter Pigeon (southern) habitat is generally defined as open-forests to sparse, open-woodlands and scrub that are; mostly dominated in the overstorey by <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Acacia</i> or <i>Calli</i>	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
V EPBC	<i>tris</i> species; remnant, regrowth or partly modified vegetation communities, and within 3 km of water bodies or courses.			
Swift Parrot <i>Lathamus discolor</i> E TSC E EPBC	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> .	No	No	No
Turquoise Parrot <i>Neophema pulchella</i> V TSC	Prefer to live on the edge of woodland adjacent to clearings, timbered ridges or creeks in farmland areas. They feed in the shade of trees and spend the majority of their day on the ground searching for food.	No	Yes	Unlikely
Varied Sittella <i>Daphoenositta chrysoptera</i> V TSC	Found in forests and woodlands including mallee and acacia.	Yes	Yes	Yes
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i> M EPBC	Found in coastal areas and inland waterways where it hunts fish.	No	No	No
White-throated Needletail <i>Hirundapus caudacutus</i> M EPBC	For a time it was commonly believed that this species did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	No	No	Unlikely
Yellow Wagtail <i>Motacilla flava</i> M EPBC	Prefers open landscapes near water source including, swamps and treatment plants.	No	No	No
FISH				
Murray Cod <i>Maccullochella peelii</i> V EPBC	The Murray Cod has the ability to live in a diverse range of habitats, including clear rocky streams, to slow flowing, turbid rivers and billabongs.	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
MAMMALS				
Brush-tailed Phascogale <i>Phascogale tapoatafa</i> V TSC	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.	No	No	No
Brush-tailed Rock Wallaby <i>Petrogale penicillata</i> E TSC V EPBC	Found in continuous rocky outcrops throughout their range with foxes reducing habitat availability across their home. prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks	No	No	Unlikely
Eastern Bentwing Bat <i>Miniopterus schreibersii oceanensis</i> V TSC	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	No	Yes	Possible
Eastern False Pipistrelle Bat <i>Falsistrellus tasmaniensis</i> V TSC	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m.	No	Yes	Possible
Eastern Pygmy Possum <i>Cercartetus nanus</i> V TSC	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes.	No	No	No
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i> V TSC	Found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. This species does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	No	Yes	Possible
Grey-headed	Grey-headed Flying-foxes are generally	No	No	Possible

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
Flying Fox <i>Pteropus poliocephalus</i> V TSC V EPBC	found within 200 km of the eastern coast of Australia. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Generally found in gullies close to water.			
Hoary Wattled Bat <i>Chalinolobus nigrogriseus</i> V TSC	In north east NSW it extends from Port Macquarie in the south, north to the Queensland border. The species has been recorded as far west as Armidale and Ashford. Occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat.	No	No	Possible
Koala <i>Phascolarctos cinereus</i> V TSC V EPBC	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	No	No	Possible
Large-eared Pied Bat <i>Chalinolobus dwyeri</i> V EPBC	Sandstone cliffs and fertile woodland valley habitat within close proximity of each other is habitat of importance to the Large-eared Pied Bat. Records from south-east Queensland suggest that rainforest and moist eucalypt forest habitats on other geological substrates (rhyolite, trachyte and basalt) at high elevation are of similar importance to the species.	No	No	No
New Holland Mouse <i>Pseudomys novaehollandiae</i> V EPBC	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	No	No	No
Rufous Bettong <i>Aepyprymnus rufescens</i> V TSC	Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. At night they feed on grasses, herbs, seeds, flowers, roots, tubers, fungi and occasionally insects.	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
Spotted-tail Quoll <i>Dasyurus maculatus maculatus</i> V TSC E EPBC	The species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	No	Yes	Unlikely
Squirrel Glider <i>Petaurus norfolcensis</i> V TSC	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or <i>Acacia</i> midstorey.	No	Yes	Possible
South-eastern Long-eared Bat <i>Nyctophilus corbeni</i> V TSC V EPBC	The distribution of the south-eastern form of the Greater Long-eared Bat coincides with the area of the Murray Darling Basin with Pilliga Scrub regions being the most favoured area of habitation. This species roosts in tree hollows, crevices and under loose bark. As a slow flying agile species, it utilises the understorey to hunt for non-flying prey items such as caterpillars and beetles. They will also hunt on the ground. This species is more common where vegetation structure includes box/ironbark/cypress-pine in areas along the western slopes and plains of NSW and southern Queensland.	No	No	Unlikely
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i> V TSC	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	No	No	Possible

REPTILIA

Bell's Turtle <i>Elseya belli</i> V TSC V EPBC	In NSW, currently found only in the upper reaches of the Namoi and Gwydir River systems, on the escarpment of the North West Slopes. Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. Occupied pools are most commonly less than 3 m deep with rocky or sandy bottoms and patches of vegetation. Most typically uses narrow stretches of rivers 30 - 40 m wide.	No	No	No
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Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
Border Thick-tailed Gecko <i>Uvidicolus sphyrurus</i> V TSC V EPBC	This species often occurs on steep rocky or scree slopes, especially on granite (NSW OEH 2013p) and it may prefer sites with easterly aspects and the base of rock scarps. Sheltering occurs in well-shaded micro-sites amongst boulders, rock slabs, fallen timber (logs or debris), bark on standing trees and deep leaf litter. The distribution of this species overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community	No	No	Unlikely
Collared Delma <i>Delma torquata</i> V EPBC	In the eastern parts of the species' range (i.e. the Toowoomba Range), suitable habitats are commonly associated with exposed rocky outcrops on ridges or slopes in vegetation communities dominated by Narrow-leaved Ironbark (<i>Eucalyptus crebra</i>). Other vegetation communities in this region are typically dominated by Lemon-scented Gum. The presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the Collared Delma microhabitat and is always present where the species occurs	No	No	Unlikely
Dunmall's Snake <i>Furina dunmalli</i> V EPBC	Dunmall's Snake has been found in a broad range of habitats, including: Forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (<i>Acacia harpophylla</i>), other Wattles (<i>A. burowii</i> , <i>A. deanii</i> , <i>A. leioclyx</i>), native Cypress (<i>Callitris</i> spp.) or Bull-oak (<i>Allocasuarina luehmannii</i>). Various Blue Spotted Gum (<i>Corymbia citriodora</i>), Ironbark (<i>Eucalyptus crebra</i> and <i>E. melanophloia</i>), White Cypress Pine (<i>Callitris glaucophylla</i>) and Bullock open forest and woodland associations on sandstone derived soils. Prefers habitats between 200 to 500 m above sea level.	No	No	No
Pale-headed Snake <i>Hoplocephalus bitorquatus</i> V TSC	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. A patchy distribution from north-east Queensland to the north-eastern quarter of NSW.	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
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THREATENED POPULATIONS

Tusked Frog population in the Nandewar and New England Tableland Bioregions <i>Adelotus brevis</i> E TSC	Rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks, ditches and ponds, and call while hidden amongst vegetation or debris.	No	No	No
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THREATENED ECOLOGICAL COMMUNITIES

Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory E EPBC	Natural temperate grassland is grassy vegetation dominated by moderately tall (25–50 cm) to tall (50–100 cm), dense to open tussock grasses in the genera <i>Austrodanthonia</i> , <i>Austrostipa</i> , <i>Bothriochloa</i> , <i>Poa</i> and <i>Themeda</i> . Up to 70% of all plant species may be forbs (i.e. herbaceous, non-grassy/non-grass-like plants). The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. It occurs within the geographical region of the Southern Tablelands of NSW and the ACT at altitudes between 560m in central and northern parts of its distribution and 1200m in the south, in valleys influenced by cold air drainage and in broad plains.	No	No	No
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland CE EPBC	Main distribution is found in the Darling Downs of southern Queensland and Liverpool and Moree Plains of northern NSW. Associated with fine textured, cracking clay soils of basalt or alluvium. Flat to very low slopes. Less than 10% canopy cover. Perennial native grasses and three or more of the listed species, dominate the ground cover.	No	No	No
New England Peppermint (<i>Eucalyptus nova-anglica</i>) Grassy Woodlands CE EPBC	Structure ranging from woodland to open forest with a tree canopy of eucalypts. It typically lacks a substantial shrub layer, but has a dense ground layer of grasses and other herbs. Tree canopy 8 to 20m high and dominated by New England Peppermint. The understory shrub layer is either sparse or absent and native grasses and herbs dominating the ground layer, mainly Grey Tussock Grass or Themeda	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
	australis species.			
Weeping Myall Woodlands E EPBC	Occurs as open woodland in areas of higher rainfall and woodlands in areas of lower rainfall. Weeping Myall trees are the sole or dominant overstorey species. The understorey is an open layer or shrubs and an open layer of grasses. The ground layer is has a diversity of grasses and forbesand varies in species composition.	No	No	No
White Box Yellow Box Blakely's Red Gum Woodland E TSC E EPBC	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. Commonly co-occurring eucalypts include Apple Box (<i>E. bridgesiana</i>), Red Box (<i>E. polyanthemos</i>), Candlebark (<i>E. rubida</i>), Snow Gum (<i>E. pauciflora</i>), Argyle Apple (<i>E. cinerea</i>), Brittle Gum (<i>E. mannifera</i>), Red Stringybark (<i>E. macrorhyncha</i>), Grey Box (<i>E. microcarpa</i>), Cabbage Gum (<i>E. amplifolia</i>) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (<i>Themeda australis</i>), Poa Tussock (<i>Poa sieberiana</i>), wallaby grasses (<i>Austrodanthonia</i> spp.), spear-grasses (<i>Austrostipa</i> spp.), Common Everlasting (<i>Chrysocephalum apiculatum</i>), Scrambled Eggs (<i>Goodenia pinnatifida</i>), Small St John's Wort (<i>Hypericum gramineum</i>), Narrow-leaved New Holland Daisy (<i>Vittadinia muelleri</i>) and blue-bells (<i>Wahlenbergia</i> spp.).	Yes	No	Yes

FLORA

Austral Toadflax <i>Thesium austral</i> V TSC V EPBC	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (<i>Themeda australis</i>).	No	No	No
Beadle's Grevillea <i>Grevillea beadleana</i> E TSC E EPBC	Known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Shannon Creek south-west of Grafton. Historical records suggest it was also once found near Walcha. Open eucalypt forest with a shrubby understorey. It is usually found on steep granite slopes at high altitudes,	No	No	Possible

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
	although the population at Shannon Creek is at a lower elevation on sandstone.			
Binghi Homoranthus <i>Homoranthus binghiensis</i> E TSC	Restricted to the Torrington area south-west of Tenterfield. Associated with isolated granitic outcrops in the far north-eastern tablelands region of NSW. It grows within sandy soil pockets in open and exposed situations on and around the margins of the outcrops. The species appears to prefer heath and shrubland patches in shallow soils at altitudes of 700 to 950 m.	No	Yes	Possible
Bolivia Hill Pimelea <i>Pimelea venosa</i> E TSC E EPBC	Vegetation is dominated by <i>Eucalyptus</i> species, with an open understorey of <i>Xanthorrhoea</i> and <i>Solanum</i> species. The limited records provide no clear search pattern for further populations. Bolivia Hill Pimelea has been recorded on deep granite soils or black sandy soils between granite boulders in open woodland.	No	No	No
Bolivia Homoranthus <i>Homoranthus croftianus</i> E TSC	Restricted to Bolivia Hill, north of Deepwater on the New England Tablelands of NSW. Associated with isolated granitic outcrops at about 1000 m altitude, growing within crevices of bare rocky slopes and in shallow acidic soil. Associated species include <i>Callitris endlicheri</i> , <i>Eucalyptus prava</i> , <i>Eucalyptus dealbata</i> , <i>Leucopogon neoanglicus</i> , <i>Micromyrtus sessilis</i> , <i>Kunzea bracteolata</i> , <i>Boronia anethifolia</i> , <i>Leptospermum novae-angliae</i> , <i>Acacia viscidula</i> , <i>Acacia pycnostachya</i> and <i>Cryptandra lanosiflora</i> .	No	No	No
Bolivia Stringybark <i>Eucalyptus boliviana</i> V TSC	<i>Eucalyptus boliviana</i> is very rare and restricted to the Bolivia Hills area between Glen Innes and Tenterfield. Endemic to NSW and restricted to dry sclerophyll woodland habitat, on granite outcrops and acid volcanics above 1000 m altitude.	No	No	No
<i>Callistemon pungens</i> V EPBC	Flowering over spring and summer, the species is characterised by its purple stamens and small, pungent leaves. it occurs from near Inverell to the eastern escarpment in New England, along rocky watercourses usually with sandy	No	Yes	Unlikely

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
	granite (or occasionally basalt) creek beds, and generally among naturalised species.			
Crescent-leaved Homoranthus <i>Homoranthus lunatus</i> V TSC V EPBC	Occurs near Tenterfield and Torrington on the New England Tablelands of NSW, including Bald Rock and Boonoo Boonoo National Parks near Tenterfield. Crescent-leaved Homoranthus grows in heath, shrub and woodland communities in sandy soils on granite outcrops and slopes.	No	Yes	Possible
Granite Boronia <i>Boronia granitica</i> V TSC E EPBC	Granite Boronia occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland. It can be locally common in appropriate habitat (e.g. Torrington). Grows on granitic soils amongst rock outcrops, often in rock crevices, and in forests and woodlands on granite scree and shallow soils. Important site characteristics include low precipitation and high levels of solar radiation.	No	Yes	Possible
Grove's Paperbark <i>Melaleuca groveana</i> V TSC	Widespread, scattered populations in coastal districts north of Yengo National Park to southeast Queensland. Also found as a disjunct population near Torrington on the northern tablelands. Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcropping granite, rhyolite and sandstone on rocky outcrops and cliffs. It also occurs in dry scrubby open forest and woodlands.	No	Yes	Possible
Heath Wrinklewort <i>Rutidosia heterogama</i> V TSC V EPBC	Occurs on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides.	No	Yes	Possible
Leafless Tongue Orchid <i>Cryptostylis hunteriana</i> V TSC V EPBC	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>)	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
	and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).			
MacNutt's Wattle <i>Acacia macnuttiana</i> V TSC V EPBC	MacNutt's Wattle occurs only on the New England Tablelands and just extending onto the North West Slopes. Found in widely scattered locations in the Tenterfield area and west to around Torrington. It grows in dry forest or woodland and heath vegetation, usually on granite or metasediments and often near streams.	No	Yes	Possible
McKie's Stringybark <i>Eucalyptus mckieana</i> V TSC V EPBC	Confined to the drier western side of the New England Tablelands of NSW, from Torrington to Bendemeer. Most populations occur on private property, but it does occur in Kings Plain National Park, Torrington State Conservation Area and Severn River Nature Reserve. <i>Eucalyptus mckieana</i> is found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites. Associated species at Northern Tablelands sites include <i>Angophora floribunda</i> , <i>Eucalyptus amplifolia</i> , <i>Eucalyptus andrewsii</i> , <i>Eucalyptus bridgesiana</i> , <i>Eucalyptus youmanii</i> , <i>Eucalyptus nicholii</i> , <i>Eucalyptus blakelyi</i> and <i>Eucalyptus conica</i> , and at North Western Slopes sites <i>Eucalyptus andrewsii</i> , <i>Eucalyptus stannicola</i> , <i>Eucalyptus prava</i> and <i>Angophora floribunda</i> .	No	Yes	Possible
Narrow-leaved Black Peppermint <i>Eucalyptus nicholii</i> V TSC V EPBC	Sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	No	No	No
Native Milkwort <i>Polygala</i>	Sandy soils in dry eucalypt forest and woodland with a sparse understorey. The species has been recorded from the	No	No	Possible

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
<i>linariifolia</i> E TSC	Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of <i>Eucalyptus caleyi</i> , <i>Eucalyptus dealbata</i> and <i>Callitris</i> , and in yellow podsolic soil on granite in layered open forest.			
Ooline <i>Cadellia pentastylis</i> V TSC V EPBC	Occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. Strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth.	No	No	No
Ovenden's Ironbark <i>Eucalyptus caleyi</i> subsp. <i>ovendenii</i> V TSC V EPBC	<i>Eucalyptus caleyi</i> subsp. <i>ovendenii</i> occurs from west of Guyra to west of Tenterfield on the New England Tablelands of NSW. Localities include 'Moorabinda' station and the western half of Torrington State Conservation Area. Grows in grassy woodland on dry, shallow soils of moderate fertility. Preferred altitudes are 610 to 820 m, on granitic substrates. Associated species include <i>Eucalyptus melliodora</i> , <i>Eucalyptus dealbata</i> , <i>Eucalyptus albens</i> , <i>Eucalyptus melanophloia</i> and <i>Geijera parviflora</i> .	No	Yes	Possible
Rodd's Star Hair <i>Astrotricha roddii</i> E TSC E EPBC	Rodd's Star Hair usually grows in low dry woodland and shrublands on granite and acid volcanic outcrops, often in rock crevices.	No	No	No
Rupp's Wattle <i>Acacia ruppii</i> E TSC E EPBC	<i>A. ruppii</i> occurs on sandy soils over sandstone in dry sclerophyll forest, in shrubland and on disturbed roadside sites where the associated species include <i>Acacia bauerlenii</i> , <i>A. quadrilateralis</i> , <i>Angophora woodsiana</i> , <i>Banksia aemula</i> , <i>Daviesia umbellata</i> , <i>Eucalyptus planchoniana</i> , <i>E. gummifera</i> , <i>E. signata</i> , <i>Lambertia formosa</i> , <i>Leptospermum trinervium</i> , <i>Hakea dactyloides</i> , <i>Gompholobium virgatum</i> and <i>Persoonia stradbrokeensis</i> . It is restricted to an altitude of about 50-150m	No	No	No
Rusty Desert Phebalium <i>Phebalium</i>	Found in the Torrington district and in Severn River Nature Reserve north-west of Glen Innes, on the New England	No	Yes	Possible

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
<i>glandulosum</i> subsp. <i>eglandulosum</i> E TSC V EPBC	Tablelands. Restricted to granite outcrop country on the New England Tablelands. Favours exposed and heathy granite areas with cracks and depressions of skeletal sandy soil located amongst the boulders. Sites tend to be relatively open, with the shrubs forming a spreading habit over the bare rocks.			
Scant Pomaderris <i>Pomaderris queenslandica</i> E TSC	It is known from several locations on the NSW north coast and a few locations on the New England Tablelands and North West Slopes, including near Torrington and Coolata. Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	No	Yes	Possible
Small Snake Orchid <i>Diuris pedunculata</i> E TSC E EPBC	Confined to north east NSW. It was originally found scattered from Tenterfield south to the Hawkesbury River, but is now mainly found on the New England Tablelands, around Armidale, Uralla, Guyra and Ebor. Grows on grassy slopes or flats. Often on peaty soils in moist areas. Also on shale and trap soils, on fine granite, and among boulders.	No	Yes	Unlikely
Tenterfield Eyebright <i>Euphrasia orthocheila</i> subsp. <i>peraspera</i> E TSC	Probably extinct throughout much of its former range, this subspecies has been recorded from Dorrigo to Tenterfield and west to Torrington, although most records are very old. Currently only known from two swamps in the Tenterfield area. Little is known about the habitat and ecology of this subspecies. Recorded from 'moist open situations' such as swamps.	No	Yes	Unlikely
Tarengo Leek Orchid <i>Prasophyllum petilum</i> E TSC E EPBC	The species is only found in high quality grassland and grassy woodland remnants not subject to continuous grazing pressure. It may be inferred that the distribution was once larger, but there is no data to support the contention. The area of occupancy is about 4.5 ha. At Ilford, Captains Flat, and Hall Cemetery the plants occur in a very limited area.	No	No	No
Tarengo Leek Orchid <i>Prasophyllum</i> s p. Wybong	The species is only found in high quality grassland and grassy woodland remnants not subject to continuous grazing pressure. It may be inferred that the distribution was once larger, but	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
CE EPBC	there is no data to support the contention. The area of occupancy is about 4.5 ha. At Ilford, Captains Flat, and Hall Cemetery the plants occur in a very limited area			
Torrington Beard-heath <i>Leucopogon confertus</i> E TSC E EPBC	Known only from a few records near Torrington on the New England Tablelands. Torrington Beard-heath possibly occurs in open forest and woodland on rocky granite areas.	No	Yes	Possible
Torrington Mint-bush <i>Prostanthera staurophylla sensu stricto</i> E TSC V EPBC	Currently known from a single granite outcrop in the Tenterfield area of the New England Tablelands. The total population of Torrington Mint-Bush is currently estimated to contain fewer than 500 individuals, however the number of mature plants is likely to be substantially smaller. Within its only current known population, the species occurs in shallow skeletal soil in rock crevices. The site is an exposed granite outcrop near the mountain summit, with skeletal gritty loam soil.	No	No	Unlikely
Torrington Pea <i>Almaleea cambagei</i> E TSC V EPBC	The majority of <i>Almaleea cambagei</i> populations occur within Torrington State Conservation Area on the New England Tablelands, with a few populations potentially occurring in the adjacent agricultural lands. Usually grows in wet heath and acid swamp areas and along watercourses on granite, above 900 m altitude.	No	Yes	Possible
Tylophora linearis V TSC E EPBC	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i> .	No	No	No
Velvet Wattle <i>Acacia pubifolia</i> E TSC V EPBC	Velvet Wattle occurs in NSW and Qld. In NSW it is known from two main populations, one north of Emmaville and the other near Warrabah National Park. It generally grows in dry shrubby woodland on granite and metasediment soils.	No	Yes	Unlikely
Wandering Pepper-cres	Perineal herb/shrub that grows to 80cm in height. Occurring from south-east	No	No	No

Common Name Scientific Name Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Likelihood of biota occurring within Study Area
<i>Lepidium peregrinum</i> E EPBC	Queensland to near Tenterfield, NSW. Found in Riparian open forest.			

10 IMPACT ASSESSMENT

10.1 SIGNIFICANCE ASSESSMENTS (TSC ACT)

The EP&A Act includes in **Section 5A**, seven factors which are to be considered when determining if a proposed development or activity '*is likely to have a significant effect on the threatened species, populations or ecological communities, or their habitats*'. These seven factors must be taken into account by consent or determining authorities when considering a development application. This enables a decision to be made as to whether there is likely to be a significant effect on the species and hence if a SIS is required (DECC 2007).

Table 10 found that 30 species listed under TSC Act were either known to, or have the potential to occur within the Study Area based on the evaluation completed. These were the:

- Barking Owl
- Black-chinned Honeyeater (eastern sub-species)
- Brown Tree-creeper (eastern sub-species)
- Hooded Robin (South-eastern form)
- Powerful owl
- Scarlet Robin
- Varied Sitella
- Eastern Bentwing Bat
- Eastern False Pipestrelle Bat
- Greater Broad-nosed Bat
- Grey-headed Flying Fox
- Hoary Wattled Bat
- Koala
- Squirrel Glider
- Yellow-bellied Sheath-tail Bat
- White Box Yellow Box Blakely's Red Gum Woodland
- Beadle's Grevillia
- Binghi Homoranthus
- Crescent-leaved Homoranthus
- Granite Boronia
- Grove's Paperbark
- Heath Wrinklewort
- MacNutt's Wattle
- McKie's Stringybark
- Native Milkwort
- Overden's Ironbark
- Rusty Desert Phebalium
- Scant Pomaderris
- Torrington Beard Heath
- Torrington Pea

The following section provides significance assessments for these entities.

Barking Owl

- (a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The Barking Owl is a medium-sized bird found across most of Australia except for central arid parts (NPWS 1999; OEH 2016c; Ziembicki 2010; Ziembicki 2007). Found in open forest and woodland and uses its habitat flexibly, hunting in more closed forest if necessary. The Barking Owl will roost in the mid-story of trees with a dense foliage cover. Tree species including Acacia and Casuarina are used by the Barking Owl (OEH 2016c). Hollow bearing trees are relied on for nesting and roosting. Two or three eggs are usually laid during winter in hollows. Pairs are territorial and require large areas of permanent habitat. Threats to this species include too-frequent fire, habitat loss and degradation and disturbance during nesting or inappropriate and excessive use of call playback. No Barking Owl were recorded during the field surveys. The species has been recorded in the locality (see **Error! Reference source not found.**) and may use the Study Area from time to time due to its foraging behaviour.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project. This relatively minor impact suggests that the Study Area would continue to provide a range of potential habitats should the Barking Owl occur.

Given these factors, it is *unlikely* that the proposed activity could have an adverse effect on the life cycle of the Barking Owl if they were present, such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

- (b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Barking Owl is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

- (c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Barking Owl is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31, 700 hectares) equating to about 0.02%.
 - ii) The location of the Proposed Disturbance Footprint and the mobile nature of the species suggest that no area of habitat of relevance to Barking Owl would become fragmented or isolated from other areas of habitat.
 - iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given that no area of occupancy has been detected within the Study Area, adjoining land despite field surveys.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Barking Owl.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is a draft Recovery Plan for Barking Owl in which the Project is consistent with the objectives as habitat for the Barking Owl will be retained.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant to the Project and Barking Owl. This is the *Clearing of native vegetation*.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to

environmental change. The Project would result in the removal of a small proportion (1.2%) of the total Study Area with the majority of woodland within and adjoining being unaffected.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on Barking Owl provided the amelioration measures detailed within **Chapter 8** are implemented.

Black-chinned Honeyeater

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Black-chinned Honeyeater is the largest of its genus. Found in drier open forests dominated by Box and Ironbark species from central Queensland to Victoria and South Australia. In NSW it is widespread but in east of the Great Dividing Range (OEH 2015c). Co-operative breeding young up to six adults can occur with each laying two to three eggs. Nests are often made in the crown of the tree. Nectar and honeydew are foraged on within a home range of at least five hectares (OEH 2016c). Habitat clearing, fragmentation or poor regeneration of habitat and climate change are all threats to the species (OEH 2016c). No Black-chinned Honeyeater were recorded during the field surveys. The species has been recorded in the locality (see **Map 2**) and has the potential to use the Study Area due to its locally nomadic behaviour.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project. This relatively minor impact suggests that the Study Area would continue to provide a range of potential habitats should the Black-chinned Honeyeater occur from time to time.

Given these factors, it is *unlikely* that the proposed activity could have an adverse effect on the life cycle of the Black-chinned Honeyeater if they were present, such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Black-chinned Honeyeater is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Black-chinned Honeyeater is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31,700 hectares) equating to about 0.02%.
 - ii) The location of the Proposed Disturbance Footprint and the mobile nature of the species suggest that no area of habitat of relevance to Black-chinned Honeyeater would become fragmented or isolated from other areas of habitat.
 - iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given that no area of occupancy has been detected within the Study Area, adjoining land despite field surveys.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Black-chinned Honeyeater.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is no recovery or threat abatement plan for Black-chinned Honeyeater.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant to the Project and Black-chinned Honeyeater. This is the *Clearing of native vegetation*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the total Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on Black-chinned Honeyeater provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Brown Treecreeper

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Brown Treecreeper occurs in eucalypt forest and woodland of inland plains and slopes of the Great Dividing Range (OEH 2016c). Dominant tree species are stringybarks or rough-barked eucalypts. Small groups of up to 12 individuals have been observed. They are sedentary and territorial although may disperse locally after breeding. Home range can be as large as 10.7 hectares (OEH 2016c). The main food source is ants, which are taken from leaf litter, grasses and fallen timber. Tree hollows are vital for nesting. Threats to the Brown Treecreeper include loss of woodland, forest and mallee habitats as a result of agriculture, forestry, mining and residential development, fragmentation and ongoing degradation of habitat, loss of understory habitat, hollows, ground litter and fallen timber and competition from invasive weed species or the noisy miner (OEH 2016c).

Brown Treecreepers were recorded during the field surveys. The species has also been recorded in the locality (see **Map 2**).

As detailed within **Table 8**, 8.39 hectares of woodland would be directly impacted by the Project. Despite this loss, the woodland of the Study Area and adjoining area is large in area (approximately 31, 700 hectares) and with consideration that the majority of this woodland would be retained and the highly mobile nature of the species, this is negligible.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Brown Treecreeper, such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Brown Treecreeper is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Brown Treecreeper is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31, 700 hectares) equating to about 0.02%.
 - ii) The activities of the Project and the mobile nature of Brown Treecreeper suggest that no area of habitat would become fragmented or isolated from other areas of habitat.
 - iii) The habitats affected by the Project are unlikely to be of importance to the long-term survival of Brown Treecreeper given the mobile and nomadic nature of the species and the absence of any breeding sites.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Brown Treecreeper.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is no recovery or threat abatement plan for Brown Treecreeper.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the project – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant to the Project and Brown Treecreeper. This being the *Clearing of native vegetation*.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the total Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is ‘*unlikely*’ to have a significant effect on Brown Treecreeper provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Hooded Robin

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Hooded Robin is known from lightly wooded habitats such as eucalypt woodlands and mallee shrublands (OEH 2016c). First recognised as a declining woodland bird (Reid 1999), Hooded Robin is now listed as Vulnerable under the TSC Act. It is generally considered that the species requires a structurally diverse habitat including microhabitat such as native grasses, shrubs and fallen timber across a territory a breeding territory of around 10 hectares. Watson *et al.* (2001) believe that the species generally exhibits demanding requirements for both habitat complexity and area (>100ha). Threats to the species include structural change to vegetation including the loss of micro habitat, aggressive competition by noisy miners and clearing of woodlands (OEH 2016c). Hooded Robin were recorded during the field surveys. The species has also previously been recorded in the locality (see **Map 2**).

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

With consideration of these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Hooded Robin such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

- (b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Hooded Robin is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

- (c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Hooded Robin is not listed as an endangered ecological community or critically endangered ecological community.

- (d) In relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) Of relevance to the Hooded Robin, the Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodlands (and known habitat) within the Study Area and adjoining SCA (approximately 31, 700 hectares) equating to about 0.02%.
 - ii) The activities of the Project suggests that no area of habitat would become fragmented or isolated from other areas of potential habitat at a local, or landscape level.
 - iii) The habitats affected by the Project are unlikely to be of importance to the long-term survival of Hooded Robin given the mobile and nomadic nature of the species and the absence of any breeding sites.
- (e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).**

At the time of writing, there is no critical habitat as listed by the TSC Act for Hooded Robin.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is no recovery or threat abatement plan for the Hooded Robin. The Project is consistent with a number of priority actions identified for this species given that only 0.02% of the woodlands of the Study Area and adjoining SCA would be directly impacted.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant to the Project and Hooded Robin. This being the *Clearing of native vegetation*.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the total Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is ‘*unlikely*’ to have a significant effect on Hooded Robin provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Powerful Owl

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Powerful Owl is endemic to eastern and south-eastern Australia (OEH 2015c). It uses species including Turpentine, Black She-oak, Blackwood and Rough-barked Apple to roost in during the day, camouflaging itself in thick foliage. They prey on small arboreal mammals and nest in large tree hollows of old eucalypts (OEH 2015c). The Powerful Owl is susceptible to predation of fledglings, road kill, secondary poisoning, noise disturbance around a nest site resulting in breeding success and loss of habitat which also affects the abundance of arboreal mammal species that they prey on (OEH 2015c). No Powerful Owl were recorded during the field surveys. The species has been recorded in the locality (see **Map 2**) and may use the Study Area.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Powerful Owl if they were present, such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Powerful Owl is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Powerful Owl is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31,700 hectares) equating to about 0.02%.

- ii) The nature of the Project and the mobile nature of Powerful Owl suggest that no area of habitat would become fragmented or isolated from other areas of habitat at a local or landscape level.
- iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given that no area of occupancy has been detected within the Study Area despite field surveys. Notwithstanding, only 1.2% of the woodland of the Study Area (or 0.02% of the Study Area and adjoining SCA) would be impacted by the Project.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Powerful Owl.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, the Powerful Owl is incorporated in the Large Forest Owl Recovery Plan. The Project is likely to be consistent with the objectives and actions identified for this species given that only 1.2% of the woodland of the Study Area would be directly impacted and no HBT's will be removed.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant to the proposed activity and Powerful Owl. This being *Clearing of native vegetation*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the total Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on Powerful Owl provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Scarlet Robin

- (a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The Scarlet Robin has a distribution from southern Queensland to south-east Australia and to Tasmania. They have a preference for dry eucalypt forests and woodlands. Within in NSW there distribution is from the coast to inland slopes. Essential habitat features are logs and fallen timber. During winter months they use open grassy and grazed areas (OEH 2016c). They use dead branches or trees to build a nest made of plant material and cobwebs and breed between July and January (OEH 2016c). Competition by Noisy Miner, reduction of habitat through overgrazing, clearing and degradation, reduction of micro habitat such as fallen timber, ground and shrub cover and loss of food, nest and foraging sites are considered threats to the Scarlet Robin (OEH 2016c). Scarlet Robin were recorded during the field surveys. The species has also previously been recorded in the locality (see **Map 2**) and may use the Study Area from time to time due to its foraging behaviour.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Scarlet Robin, such that a viable local population of the species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Scarlet Robin is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Scarlet Robin is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31,700 hectares) equating to about 0.02%.

ii) The minor nature of the Project and the mobile nature of the Scarlet Robin suggest that no area of habitat would become fragmented or isolated from other areas of habitat.

iii) The habitats affected by the Project are unlikely to be of importance to the long-term survival of Scarlet Robin given the mobile and nomadic nature of the species and the absence of any breeding sites.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Scarlet Robin.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing no recovery plan is in place for Scarlet Robin.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant. This being *Clearing of native vegetation*.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2% of the total Study Area or 0.02% of the Study Area and adjoining SCA) with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is ‘*unlikely*’ to have a significant effect on Scarlet Robin provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Varied Sittella

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Barrett *et al.* 2007; Ford *et al.* 2001). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.

The species was listed as Vulnerable under the TSC Act after long being recognised as a declining woodland bird (Reid 1999). Varied Sittella were recorded during the field surveys. The species has also previously been recorded in the locality (see **Map 2**) and may use the Study Area from time to time due to its foraging behaviour.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Varied Sittella such that a viable local population of the species, if one were present, is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Varied Sittella is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Varied Sittella is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

- i) Of relevance to the Varied Sittella, the Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the Study Area equating to only 1.2% of the woodland present within the Study area and negligible given the highly nomadic nature of this species. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31, 700 hectares) equating to about 0.02%.
- ii) The activity of the Project and mobile nature of the species suggest that no area of habitat would become fragmented or isolated from other areas of potential habitat at a local or landscape level.
- iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given the mobile nature of the species. Notwithstanding, only 1.2% of the woodland of the Study Area would be impacted by the Project.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Varied Sittella.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is no recovery or threat abatement plan for the Varied Sittella.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant. This being the *Clearing of native vegetation*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (0.02%) of the woodland of the Study Area and adjoining SCA with the majority of woodland within and adjoining being unaffected.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on Varied Sittella provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Koala

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Koala has a distribution from northern Queensland to the Eyre Peninsula, South Australia. They prefer Eucalypt woodland. Home range varies in size from two to several hundred hectare in size and they selectively browse on a couple of tree species within their range (OEH 2016c, Menkorst and Knight 2011)). Eucalypt and non-eucalypt species are browsed on by Koalas. Records from the area show that the last occurrence in the vicinity of the survey area was 1997 and 2007 (OEH 2016b). No feed tree species as listed under SEPP 44, along with the absence of scratch marks suggest they may have moved from the area.

Threats to survival for this species include intense fire in the canopy of trees, predation and habitat modification and fragmentation (OEH 2016c).

No Koalas were detected during field survey. However the species has previously been recorded in the locality (see **Map 3**) and may use the Study Area for foraging resources.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Koala such that a viable local population of the species (should one exist) is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Koala is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Koala is not listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

- i) The Project would remove 8.39 hectares of potential, but marginal (not known) habitat. This impact is minimal in the context of the Study Area equating to only 2.9% of the woodland present.
- ii) The relatively minor nature of the Project suggests that no area of habitat would become fragmented or isolated from other areas of potential habitat at a local or landscape level.
- iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given that no area of occupancy has been detected within the Study Area or adjoining land despite field surveys. Notwithstanding, only 1.2% of the woodlands of the Study Area would be impacted by the Project.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for Koala.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A final recovery plan for the Koala was prepared in 2008 (NPWS 2002). The Project is generally consistent with the actions within this plan in that field surveys have been conducted to date within the Study Area.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, a number of other KTP are relevant to the Project and Koala. These are the *Clearing of native vegetation* and *Predation by the European Red Fox* *Vulpes Vulpes*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the woodland of the Study Area with the majority of woodland within and adjoining being unaffected.

'Predation by the European Fox *Vulpes vulpes*' on medium-sized ground-dwelling and semi-arboreal mammals, ground-nesting birds and turtles has resulted a severe decline and extinction of some species. A Fox Threat Abatement Plan for NSW has been prepared to control for biodiversity across all land tenures (OEH 2015b). A pest management plan, which should include the Fox, has been recommended in **Chapter 8**.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on Koala provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Squirrel Glider

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The distribution of the Squirrel Glider is sparse from northern Queensland to western Victoria. The species inhabits mature or old growth Box, Box-Ironbark and Red Gum forests west of the Great Dividing Range. Shrub or Acacia sp. mid-story and plenty of tree hollows are key habitat features (OEH 2016c). The Squirrel Glider is a small arboreal mammal that feeds on nectar, pollen or sap. They can glide from tree to tree up to 90m and rarely come to ground (Menkorst and Knight 2011). Threats to this species include habitat loss, degradation and fragmentation, other fauna outcompeting the Squirrel Glider for foraging or nesting resources, predation or loss of feed species (OEH 2015c). Squirrel Gliders was not recorded during the field surveys. The species has also previously been recorded in the locality (see **Map 3**) and may use the Study Area for foraging or nesting resources.

As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of the Squirrel Glider such that a viable local population of the species, if one was present, is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

- (b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Squirrel Glider is not listed as an endangered population. It is listed as Vulnerable under the TSC Act.

- (c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Squirrel Glider is not listed as an endangered ecological community or critically endangered ecological community.

- (d) In relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

- i) Of relevance to the Squirrel Glider, the Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the Study Area equating to only 1.2% of the woodland present within the Study Area and negligible given the highly nomadic nature of this species and available woodland in the adjoining SCA (approximately 31, 700 hectares).
- ii) The mobile nature of the species suggest that no area of habitat would become fragmented or isolated from other areas of potential habitat at a local, or landscape level.
- iii) The habitat affected by the Project is unlikely to be of importance to the long-term survival of this species given that no area of occupancy has been detected within the Study Area or adjoining land despite field surveys. Notwithstanding, only 1.2% of the woodland of the Study Area or 0.02% of the Study Area and adjoining SCA would be impacted by the Project.

- (e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).**

At the time of writing, there is no critical habitat as listed by the TSC Act for Squirrel Glider.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At the time of writing, there is no recovery or threat abatement plan for the Squirrel Glider.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant. This being the *Clearing of native vegetation*.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the woodland of the Study Area with the majority of woodland within and adjoining being unaffected.

Conclusion

With consideration of all seven factors, the Project is ‘*unlikely*’ to have a significant effect on Squirrel Glider provided the amelioration measures detailed within **Chapter 8** are fully implemented.

Microchiropteran and Megachiropteran Bats (Eastern Bentwing Bat, Eastern False Pipistrelle Bat, Greater Broad-nosed Bat, Grey-headed Flying Fox, Hoary Wattled Bat, Yellow-bellied Sheath-tail Bat)

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Eastern False Pipistrelle is found from southern Queensland to Tasmania along the coast and ranges. They use hollows, bark and buildings to roost in. A preference is shown for trees taller than 20m in moist habitat. Key threats are disturbance to winter and breeding sites loss of habitat and fragmentation of foraging habitat (OEH 2016c).

The Eastern Bentwing Bat is distributed on the east and north-west coasts of Australia. Roost habitat ranges from caves, mines, storm water tunnels and man-made structures including buildings (OEH 2016c). The Eastern Bentwing Bat can disperse up to 300km after breeding and return to the maternity roost the following breeding season. They use forested areas to hunt prey (OEH 2016c).

The Greater-broad Nosed Bat has a distribution along the entire NSW, and parts of the Queensland, east coast. A large reddish to dark brown bat that roost in tree hollows, under bark, in crevices and fissures and buildings, similar to the Eastern False Pipistrelle bat

(Churchill 2008). They are within a wide variety of habitats including mature coastal forest, rainforest, open and swamp woodland, wet and dry sclerophyll forests paddock and creeks (Churchill 2008).

The Hoary Wattled Bat has a coastal distribution from far north New South Wales extending around Queensland, Northern Territory and in to Western Australia. They roost in tree hollows of eucalyptus trees but have been found in rock crevices (Churchill 2008). Habitat includes but is not limited to tall open forest, open woodland and dry sclerophyll forest. They can be found foraging around dams and waterholes in drier areas hunting for a variety of insects from spiders to beetles (Churchill 2008).

The Yellow-bellied Sheath-tail Bat is a large, distinctly colored, insectivorous bat that is distributed across the majority of Australia excluding parts of South Australia and southern Western Australia (Churchill 2008, OEH 2015c). They roost in tree hollows or buildings and utilise mammal burrows in areas where trees do not exist (OEH 2015c). They have no specific habitat type and are found in almost all habitats (Churchill 2008).

Unlike the previously mentioned species, the Grey-headed Flying Fox is a large megachiropteran bat species. It has a wing span of up to one and a half metres and a head-body length of 24cm on average. They are found along the entire east coast of Australia, from Victoria to Maryborough in Queensland (Churchill 2008). Camps of several thousand individuals are formed in dense vegetation greater than three metres tall. Roosts are typically near water sources in native or introduced trees. They can travel up to 50km a night to forage on fruit, nectar, pollen and flowers (Churchill 2008).

Due to equipment failure no bat species were recorded during the field surveys. However the Eastern Bentwing Bat, Eastern False Pipistrelle Bat and Greater Broad-nosed Bat species have previously been recorded in the locality (see **Map 3**) and may use the Study Area for foraging or hollow resources.

Microchiropteran bats are regarded as highly mobile fauna, extending their foraging ranges over tens of kilometres from their roosting site and are unlikely to rely on a single location for foraging (Pavey and Burwell 2004; Pennay and Freeman 2005). Hollow bearing trees are present across the Study Area, which provide potential suitable roosts sites for microchiropteran bats.

The Project would result in the removal of habitat that has the potential to provide foraging habitat for microchiropteran bats. As detailed within **Chapter 7**, about 8.39 hectares of woodland/forest would be directly impacted by the Project (approximately 0.02% of the woodland within the Study Area and adjoining area or 1.2% of the woodland of the Study Area or approximately 2.9% of the Project area). Despite this loss, the Study Area and adjoining SCA is large in area (approximately 31,700 hectares) with the majority not impacted by the Project.

Given these factors, it is *unlikely* that the Project could have an adverse effect on the life cycle of these species, such that a viable local population of these species is likely to be placed at risk of extinction provided the amelioration measures within **Chapter 8** are implemented.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the

endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

None of these species are listed as an endangered population. They are all listed as Vulnerable under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

None of these species are listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of potential (not known) habitat. This impact is minimal in the context of the woodland of the Study Area and adjoining SCA (approximately 31, 700 hectares) equating to about 0.02%. No HBT are to be removed by the Project.
 - ii) No area of habitat would become fragmented or isolated from other areas of habitat at a local or landscape level.
 - iii) Foraging habitat is not limited across the Study Area. This is evidenced by the large extent of woodland that comprises the Study Area and adjoining SCA (approximately 31, 700 hectares) across the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for any of the microchiropteran bats considered within this assessment.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The action proposed is consistent with the Action Plan for Australian Bats (DoE 1999) and is consistent with the recovery objectives identified for the Grey-headed Flying Fox species including the retention of HBT's.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, one KTP is relevant. This being *Clearing of native vegetation*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the woodland of the Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on microchiropteran bats provided the amelioration measures detailed within **Chapter 8** are fully implemented.

White Box, Yellow Box, Blakely's Red Gum Woodland Threatened Ecological Community (Box-Gum Woodland – BGW)

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

BGW is not a threatened species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

BGW is not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

BGW is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*). Intact sites contain a high diversity of plant species including some shrub species, several climbing plant species, many grasses and a very high diversity of herbs (OEH 2016c). It generally occurs on fertile lower parts of the landscape where resources such as water and nutrients are abundant (OEH 2016c). Sites that retain only a grassy groundlayer, with few or no trees remaining are considered important for rehabilitation and to rebuild connections between sites of better quality (OEH 2016c).

OEH (2016c) identify the following threats to BGW:

- Clearing, degradation and fragmentation of remnants for agricultural, forestry, infrastructure and residential development
- Continuous heavy grazing and trampling of remnants by grazing stock, resulting in losses of plant species (simplification of the understorey and groundlayer and suppression of overstorey), erosion and other soil changes (including increased nutrient status)
- Invasion of remnants by non-native plant species, including noxious weeds, pasture species and environmental weeds, including garden escapes, olives and pines
- Invasion of remnants by feral animals resulting in the loss or modification of habitat
- Disturbance and clearance of remnants during road, rail and infrastructure maintenance and upgrades
- Harvesting of firewood (either living or standing dead, including material on the ground).
- Collection of on-ground woody debris in the guise of a 'clean-up'

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity.

Of these threats, the first and fifth threats are of likely relevance when considering the potential impact of the Project. The Project would result in the removal of about 0.27 hectares of BGW. About 6.29 hectares of BGW would remain within the Study Area. This relatively minor loss of vegetation is considered negligible in the context of the extent of BGW remaining. Mitigation measures detailed within **Section 8** would ensure that potential impact to the Box-Gum Woodland are minimised to the greatest extent possible.

Therefore, the Project is *unlikely* to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

- i. The Project would result in the removal of about 0.27 hectares of BGW.
- ii. The Project would not isolate or fragment other areas of habitats further than those impact that pre-exist given the existing fragmentation in the landscape and the minor nature of the impact proposed.
- iii. Due to the existing fragmentation of this endangered community and remaining area of BGW within the Torrington State Forest and directly adjoining which would remain unaffected by this Project, it is *unlikely* that the removal of this portion of habitat is of importance to the long-term survival of this community in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for Box-Gum Woodland under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

At the time of writing, a national recovery plan has been prepared for the EPBC Act critically endangered ecological ecosystem, White Box, Yellow Box, Blakely's Red Gum Woodland (DECCW 2011). The objectives of this plan are relevant to the TSC Act listed endangered ecological community present within the Study Area and subject to this Project. The extent and nature of Project and the quality of vegetation that would be affected, as discussed in point d), indicate that the Project would be consistent with the objectives of this plan.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

While the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, *Clearing of native vegetation* is.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of approximately 0.27 hectares of BGW. About 6.29 hectares of BGW would remain within the Study Area. This relatively minor loss of vegetation is considered negligible in the context of the extent of BGW remaining.

With consideration of these factors, the Project is unlikely to result in the operation of, or increase the impact of, a key threatening process.

Conclusion

This Assessment of Significance has determined that the Project is 'unlikely' to have a 'significant effect' on White Box, Yellow Box, Blakely's Red Gum Woodland. Therefore, the proposed activity would not require a Species Impact Statement.

Flora species (Beadle's Grevillia, Binghi Homoranthus, Crescent-leaved Homoranthus, Granite Boronia, Groves Paperbark, Heaath Wrinklewort, MacNutt's Wattle, McKie's Stringybark, Native Milkwort, Ovenden's Ironbark, Rusty Desert Pheblium, Scant Pomaderris, Torrington Beard Heath and Torrington Pea)

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Beadle's Grevillia has been found to occur in four separate populations including the Torrington State Conservation Area. Habitat preference is open eucalypt forest with a shrubby understorey, usually found on steep granite slopes (OEH 2016c).

Binghi Homoranthus is restricted to the Torrington area. Associated with isolated granitic outcrops in the far north-eastern tablelands region of NSW. It grows within sandy soil pockets in open and exposed situations on and around the margins of the outcrops. The species appears to prefer heath and shrubland patches in shallow soils at altitudes of 700 to 950 m (OEH 2016c).

Crescent-leaved Homoranthus Occurs near Tenterfield and Torrington on the New England Tablelands of NSW. Crescent-leaved Homoranthus grows in heath, shrub and woodland communities in sandy soils on granite outcrops and slopes.

Granite Boronia occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland. It can be locally common in appropriate habitat (e.g. Torrington). Grows on granitic soils amongst rock outcrops, often in rock crevices, and in forests and woodlands on granite scree and shallow soils. Important site characteristics include low precipitation and high levels of solar radiation (OEH 2016c).

Groves Paperbark is a small tree that grows up to five metres tall. It has curved narrow leaves and fibrous papery bark. Similar to the previous species mentioned, it grows in heath and shrubland on granite outcrops, rhyolite and sandstone (OEH 2016c).

Heath Wrinklewort is part of the daisy family and grows upto to 30cm tall. As well as being recorded in sandy soils and open moist forest, it has also been found along roadsides (OEH 2016c).

MacNutt's Wattle is a shrub that grows up to three metres tall and blooms in yellow flowers July-September. Scattered widely in around Tenterfield and Torrington. It grows in dry forest, woodland or heath. It has a preference for granite or metasediments and has often been recorded in the vicinity of streams (OEH 2016c).

McKie's Stringy bark is found between Torrington and Bendemeer, including Torrington State Conservation area. Red-brown fibrous species that grows to 25m on average. White flowers blossom March-May (OEH 2016c). Ovenden's Ironbark is a rough-barked eucalyptus species

that grows to 25m tall. It has dark, deep corrugated bark. Distribution includes the western half of Torrington State Forest. Associated species include but are not limited to *E. delbata*, *E. albens* and *E. melliodora*. Can be abundant in grassy woodland habitat (OEH 2016c).

Native Milkwort has been found to be growing in the Torrington district in sandy loam on granite. A small perianal herb flowering blueish, yellow or occasionally white during spring-summer (OEH 2016c).

Rusty Desert Pheblium is found in the Torrington area and Seven River Nature Reserve. A medium sized shrub that flowers resemble yellow stars. Restricted to granite areas with sandy soils that is relatively open, allowing for the species to spread. Associated with *Acacia*, *Kunzea*, *Leptospermum* and *Prostanthera* species. Fire is thought to be a main threat to this species (OEH 2016c).

Scant Pomaderis is a large shrub growing to between two and three metres tall that produces creamy yellow flowers in spring. The species has been recorded across north-west NSW, New England Tablelands, including the Torrington area, and into Queensland. It grows in moist eucalytp forest or sheltered woodland and shows a preference for areas that have a shrubby understory (2016c).

Torrington Beard-heath is a small shrub that has only been recorded near Torrington. It may occur on rocky granite areas in open forest or woodland (OEH 2016c). There is limited information available due to its low occurrence and distribution. It is suseptable to many threats including mining, clearing of habitat, disturbance and grazing by feral pigs and dieback caused by root rot fungus (OEH 2016c).

Torrington Pea is a medium sized shrub up to two metres tall with orange-yellow pea flowers. Flowering occurs September-November. This species is known to occur in a few areas; Torrington State Conservation Area and a small number of populations potentially occurring in agricultural land adjoining the area and Girraween National Park in Queensland. Infrequent fire may result in the decline of a population. Commonly occurring along watercourses on granite above 900m, wet heat and acid swamp habitats (OEH 2016c)

None of the listed species were recorded in the Study Area. All of the listed flora species have been recorded in the locality (see **Map 4**) and therefore have the potential to exist within the Study Area.

The Project would result in the direct impacts to a minimal 0.3% of the woodland of the Study Area. Given these factors and provided the amelioration measures within **Chapter 8** are implemented, it is *unlikely* that the Project could have an adverse effect on the life cycle of these species, such that a viable local population of these species is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

None of these species are listed as an endangered population. All species, except Binghi Homoranthus, Native Milkwort, Rusty Desert Pheblium, Scant Pomaderris, Torrington Beard

Heath and Torrington Pea, are listed as Vulnerable under the TSC Act. The remaining six species mentioned are listed as Endangered under the TSC Act.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

None of these species are listed as an endangered ecological community or critically endangered ecological community.

(d) In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**
- i) The Project would remove 8.39 hectares of woodland. This impact is minimal in the context of the woodland of the Study Area (approximately 690 hectares) equating to only 1.2%.
 - ii) The relatively minor nature of the Project suggests that no area of habitat would become fragmented or isolated from other areas of habitat at a local or landscape level.
 - iii) Available habitat is not limited across the Study Area. This is evidenced by the large extent of woodland that comprises the Study Area and adjoining SCA (approximately 31,700 hectares) across the locality. However, if pre-clearance surveys are undertaken as part of the drilling process as detailed in **Section 8**, then it is unlikely that the Project will affect any habitat of importance.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At the time of writing, there is no critical habitat as listed by the TSC Act for any of the flora species considered within this assessment.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has been prepared for Beadle's Grevillea, Granite Boronia, A Management Plan has been prepared for MacNutt's Wattle. Provided amelioration measures outlined in **Chapter 8** are followed then the Project would minimise or exclude any impact on Boronia.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Whilst the proposed activity – mineral exploration – is not recognised as a key threatening process (KTP) under schedule 3 of the TSC Act, a number of other KTP are relevant. These are *Invasion of native plant communities by exotic perennial grasses*, *Infection of native plants by Phytophthora cinnamomi* and *Clearing of Native Vegetation*.

'Invasion of native plant communities by exotic perennial grasses' has an adverse impacts on biodiversity. A relatively small number of perennial grasses actually seriously affect native plant communities. White Box Yellow Box Blakelys Red Gum woodland is threatened by Coolatai grass. Coolatai grass dominates large areas of pasture, roadsides, travelling stock routes and areas of remnant vegetation in the North Western Slopes, especially in the Manilla area north of Tamworth (OEH 2016c).

'Infection of native plants by *Phytophthora cinnamomi*' is a soil borne pathogen that spreads in plant roots in warm, moist conditions. The pathogen appears to be widespread in coastal forests, but may also occur at higher elevations and infects a wide range of species (OEH 2016c).

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing any area of native vegetation, may lead to significant impacts on biological diversity such as habitat fragmentation leading to limited gene flow between small isolated populations, which may lead to a reduction in the potential for biodiversity to adapt to environmental change. The Project would result in the removal of a small proportion (1.2%) of the woodland of the Study Area with the majority of woodland within and adjoining being unaffected.

With these considerations, it is unlikely that the Project would increase the impact of any KTP.

Conclusion

With consideration of all seven factors, the Project is '*unlikely*' to have a significant effect on native flora provided the amelioration measures detailed within **Chapter 8** are fully implemented.

10.2 SIGNIFICANCE ASSESSMENTS (EPBC ACT)

10.2.1 Threatened Species

The Study Area has potential habitat for two fauna species, 10 flora species and one TEC listed as threatened under the EPBC Act, Grey-headed Flying Fox and Koala, Beadle's Grevillia, Binghi Homoranthus, Crescent-leaved Homoranthus, Granite Boronia, Groves Paperbark, Heaath Wrinklewort, MacNutt's Wattle, McKie's Stringybark, Native Milkwort,

Ovenden's Ironbark, Rusty Desert Pheblum, Scant Pomaderris, Torrington Beard Heath, Torrington Pea and White Box, Yellow Box, Blakely's Red Gum Woodland Threatened Ecological Community (Box-Gum Woodland – BGW) (discussed in **Section 10.1**).

Grey-headed Flying Fox

Will the action lead to a long-term decrease in the size of an important population of a species?

No. Despite field surveys, Grey-headed Flying Fox were not found to be present in the Study Area nor have they been previously recorded there.

The proposed action would remove only a small proportion of the woodland of the Study Area (1.2%). This is negligible given the highly mobile nature of this species

Given this, it is unlikely that the proposed action could result in a long-term decrease in the size of an important population (should one occur there) of the Grey-headed Flying Fox.

Will the action reduce the area of occupancy of an important population?

No. There is no population of importance listed at the Study Area or surrounding land. It is unlikely that an important population occurs within the Study Area given the absence of Grey-headed Flying Fox during the field surveys.

Despite the proposed action removing 1.2% of potential woodland habitat within the Study Area, the highly mobile nature of Grey-headed Flying Fox suggests that an area of occupancy of an important population (should one even occur) would not be reduced.

Will the action fragment an existing population into two or more populations?

No population (should they occur there) would be fragmented into two or more populations by the proposed activity given the mobility of the Grey-headed Flying Fox.

Will the action adversely affect habitat critical to the survival of a species?

No. The vegetation community of the Study Area is relatively widespread in the region. The proposed action would result in the removal of 8.39 hectares of woodland. However, this equates to only a relatively small proportion of the woodland of the Study Area (1.2% or 0.02% of the Study Area and adjoining SCA) which is negligible with consideration of the mobility of the species.

Will the action disrupt the breeding cycle of an important population?

No. Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for the action to disrupt a breeding cycle of the Grey-headed flying Fox should it breed within the Study Area. Therefore, it is considered unlikely that the proposed action would disrupt the breeding cycle an 'important population' (should one even occur there) provided the amelioration measures are fully implemented.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

No. Grey-headed Flying Foxes are highly mobile in nature, widely foraging over tens of kilometres. It is unlikely that the removal of less than 1.2% of the woodland of the Study Area would cause the species to decline.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposed action may increase the abundance of weeds in the area and their spread should be managed via an appropriate framework as outlined in **Chapter 8**. This impact is manageable and unlikely to be significant.

Will the action introduce disease that may cause the species to decline?

No. Amelioration measures detailed in **Chapter 8** suggest that this potential impact is manageable and unlikely to be significant.

Will the action interfere with the recovery of the species?

No. Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for the action to disrupt a breeding cycle of the Grey-headed Flying Fox should it breed within the Study Area. It is therefore, unlikely that the Project would have an impact on the recovery of this species.

Koala

Will the action lead to a long-term decrease in the size of an important population of a species?

No. Despite field surveys, Koalas were not found to be present in the Study Area. The last known record of Koala in land adjoin the Study Area was in 2007.

The proposed action would remove only a small proportion of the woodland of the Study Area (1.2%) of which none would be foraging resources.

Given this, it is unlikely that the proposed action could result in a long-term decrease in the size of an important population (should one occur there) of the Koala.

Will the action reduce the area of occupancy of an important population?

No. There is no population of importance listed at the Study Area or surrounding land. It is unlikely that an important population occurs within the Study Area given the absence of feed tree species and no Koalas recorded during the field surveys.

Despite the proposed action removing 1.2% of potential woodland habitat within the Study Area, there are no known foraging tree species in the Study Area.

Will the action fragment an existing population into two or more populations?

No population (should they occur there) would be fragmented into two or more populations by the proposed activity given the size of the Project and the mobility of the Koala.

Will the action adversely affect habitat critical to the survival of a species?

No. There is no critical habitat including feed trees present at the Study Area. The Project would not impact on land adjoining the Study Area which consists of similar vegetation communities, therefore habitat would still be available should Koala use the area.

The proposed action would result in the removal of 8.39 hectares of woodland. However, this equates to only a relatively small proportion of the woodland of the Study Area (1.2%) and a smaller portion (0.02%) when looking at the adjoining SCA, which is negligible.

Will the action disrupt the breeding cycle of an important population?

No. Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for the action to disrupt a breeding cycle of the Koala should it breed within the Study Area. Therefore, it is considered unlikely that the proposed action would disrupt the breeding cycle of an 'important population' (should one even occur there) provided the amelioration measures are fully implemented.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

No. It is unlikely that the removal of less than 1.2% of the woodland of the Study Area would cause the species to decline.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposed action may increase the abundance of Fox in the area and their spread should be managed via an appropriate framework at outlined in **Chapter 8**. This impact is manageable and unlikely to be significant.

Will the action introduce disease that may cause the species to decline?

No. Amelioration measures detailed in **Chapter 8** suggest that this potential impact is manageable and unlikely to be significant.

Will the action interfere with the recovery of the species?

No. Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for the action to disrupt a breeding cycle of the Koala should it breed within the Study Area. It is therefore, unlikely that the Project would have an impact on the recovery of this species.

Beadle's Grevillia, Binghi Homoranthus, Crescent-leaved Homoranthus, Granite Boronia, Groves Paperbark, Heaath Wrinklewort, MacNutt's Wattle, McKie's Stringybark, Native Milkwort, Ovenden's Ironbark, Rusty Desert Pheblum, Torrington Beard Heath and Torrington Pea

Will the action lead to a long-term decrease in the size of an important population of a species?

The proposed activity has the potential to reduce the size of important populations of species mentioned, in particular Torrington Beard Heath and Torrington Pea. However, provided pre-clearance surveys are undertaken, as described in **Chapter 8**, this can be avoided.

Will the action reduce the area of occupancy of an important population?

The proposed action may reduce the area of occupancy and can be managed via an appropriate framework at outlined in **Chapter 8**. This impact is manageable and unlikely to be significant.

Will the action fragment an existing population into two or more populations?

The proposed action has the potential to fragment an existing population should one occur and can be managed via an appropriate framework at outlined in **Chapter 8**. This impact is manageable and unlikely to be significant.

Will the action adversely affect habitat critical to the survival of a species?

The proposed action has the potential to affect habitat critical to the survival of species mentioned. This impact can be managed and is unlikely to be significant if amelioration outlined in **Chapter 8** is followed.

Will the action disrupt the breeding cycle of an important population?

Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for the action to disrupt a breeding cycle of the flora species mentioned should one occur within the Study Area. Therefore, it is considered unlikely that the proposed action would disrupt the breeding cycle an 'important population' (should one even occur there) provided the amelioration measures are fully implemented.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposed action has the potential to impact a threatened flora species. However, if amelioration measures in **Chapter 8** are implemented it is unlikely to cause a species decline.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposed action may increase the abundance of weeds in the area and their spread should be managed via an appropriate framework at outlined in **Chapter 8**. This impact is manageable and unlikely to be significant.

Will the action introduce disease that may cause the species to decline?

The proposed action may increase the risk of *Phytophthora cinnamomi*. Amelioration measures detailed in **Chapter 8** suggest that this potential impact is manageable and unlikely to be significant.

Will the action interfere with the recovery of the species?

No. Amelioration measures detailed within **Chapter 8** provides a framework to minimise the potential for a species to recover within the Study Area. It is therefore, unlikely that the Project would have an impact on the recovery of any species mentioned.

White Box, Yellow Box, Blakely's Red Gum Woodland Threatened Ecological Community (Box-Gum Woodland – BGW)

Will the action reduce the extent of an ecological community?

Yes. The proposed action will result in the removal of approximately 0.27 hectares of BGW. However, in the context of the extent of this community, up to 6.29 hectares of this same community will remain within the Study Area.

Will the action fragment or increase fragmentation of an ecological community?

No area of the ecological community would be fragmented into two or more populations given the design of the Project and the existing environment.

Will the action adversely affect habitat critical to the survival of an ecological community?

No. The community located within the Study Area is not considered critical to this ecological community for their survival given the remaining area within the Study Area and that across the locality.

Will the action modify or destroy abiotic (non-living) factors necessary for an ecological communities survival, including reduction of groundwater levels or substantial alteration of surface water drainage patterns?

No. The Project will not modify or destroy abiotic factors necessary for the survival of the retained portions of the community within the Study Area.

Will the action cause a substantial change in species composition of an occurrence of an ecological community, including causing a decline or loss of functionality of important species?

No. While a small portion of this community will be removed by the Project, retained areas of the ecological community will not be affected particularly in the context of the mitigation measures outlined within **Section 8**.

Will the action cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- *Assisting invasive species, that are harmful to the listed ecological community, to become established?*
- *Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?*

No. The removal of 0.27 hectares of this community is considered minor in the context of those portions retained within the Study Area, and in the locality. With the implementation of the mitigation measures outlined in **Section 8**, it is unlikely that the action would cause a substantial reduction in the quality or integrity of the retained areas of this ecological community.

Will the action interfere with the recovery of an ecological community?

No. Given the relatively minor nature of the proposed action, the extent of similar or higher quality habitats in the locality, and the adoption of the mitigation measures outlined in **Section 8**, it is unlikely that the Project would have an impact on the recovery of this community.

Conclusion

With consideration of the assessments completed within **Section 10**, the Project is *unlikely* to have a significant effect on threatened or migratory species as listed by the EPBC Act.

Based on this, referral to the Commonwealth Minister is not warranted.

10.2.2 Migratory Species

Protected under several international agreements to which Australia is a signatory, Migratory species are considered Matters of National Environmental Significance under the EPBC Act.

Two migratory species are known to, or predicted to occur within the vicinity of the Project (see **Table 10**). These being the Rainbow Bee-eater (*Merops ornatus*) and Rufous Fantail (*Rhipidura rufifrons*).

Under the EPBC Act, an action is likely to have a significant impact on a migratory species if it substantially modifies, destroys or isolated an area of 'important habitat' for the species (DotE 2013). For these species, the Study Area is not considered to comprise 'important habitat' as it does not contain:

- Habitat used by a migratory species occasionally or periodically within a region that supports an ecological significant proportion of the population of the species
- Habitat that is of critical importance to the species at particular life-cycle stages
- Habitat used by a migratory species that is at the limit of the species' range
- Habitat within an area where the species is declining (DotE 2013).

Given this, the impact of the Project on Rainbow Bee-eater and Rufous Fantail are unlikely to be regarded as significant and are not considered further.

10.3 SUMMARY OF SIGNIFICANCE ASSESSMENTS

10.3.1 Significance Assessments (TSC Act)

Significance Assessments completed in **Section 10.1** have determined that the Project is *'unlikely'* to have a *'significant effect'* on Barking Owl, Black-chinned Honeyeater (eastern subspecies), Brown Tree-creeper, Hooded Robin, Powerful owl, Scarlet Robin, Varied Sitella, Koala, Squirrel Glider, Eastern Bentwing Bat, Eastern False Pipestrelle Bat, Greater Broad-nosed Bat, Grey-headed Flying Fox, Hoary Wattled Bat, Yellow-bellied Sheath-tail Bat, Beadle's Grevillia, Binghi Homoranthus, Crescent-leaved Homoranthus, Granite Boronia, Groves Paperbark, Heath Wrinklewort, MacNutt's Wattle, McKie's Stringybark, Native Milkwort, Overden's Ironbark, Rusty Desert Pheblum, Scant Pomaderris, Torrington Beard Heath, Torrington Pea and White Box, Yellow Box, Blakely's Red Gum Woodland provided that the amelioration measures detailed within **Chapter 8** are fully implemented.

Therefore, a species impact statement is not required.

10.3.2 Significance Assessments (EPBC Act)

Significance Assessments completed within **Section 10.2** have determined that the proposed action is *unlikely* to have a significant impact on threatened and migratory biota listed by the EPBC Act provided the amelioration measures outlined in **Chapter 8** are fully implemented.

Therefore, the Project would not require referral to the Commonwealth Minister.

10.4 OTHER MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The Protected Matters Search Tool results revealed the presence of listed threatened ecological communities, threatened species and migratory species (**Appendix 2**). These biota have been assessed in **Chapter 9** for their potential to occur within the Study Area, and where appropriate, additional assessment has occurred in **Section 10.2**. Other matters identified by the Protected Matter Search Tool are:

- 14 Listed Marine Species.
- Two State and Territories Reserve.
- One Regional Forest Agreement.
- 22 Invasive species.

Invasive species are considered throughout various sections of this Ecology Assessment and are *unlikely* to have a significant effect on any matter of NES in combination with the amelioration measures proposed in **Chapter 8**.

11 CONCLUSION

This Ecology Assessment has adequately considered the ecology of the Study Area by:

- conducting a desktop analysis to consider biodiversity across the locality.
- conducting a field assessment that is consistent with OEH guidelines.
- adopting the precautionary principle in the assessment of impact.
- designing appropriate ameliorations measures to mitigate potential impacts to an acceptable level.

This report has determined that the Project is unlikely to have a significant effect of any listed threatened species, communities, populations and their habitats in accordance with s5A of the NSW *Environmental Planning & Assessment Act 1979* provided amelioration measures as detailed within **Chapter 8** are adopted, implemented and maintained. Therefore, a species impact statement is not required.

This report has also determined that the Project is unlikely to have a significant effect on any EPBC Act listed threatened and migratory biota and their habitats. Therefore, a referral to the Commonwealth Environment Minister is not warranted.



Mr. Steve Sass

Director / Principal Ecologist

Envirokey Pty. Ltd.

16 May 2016

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13 APPENDICES

APPENDIX 1 – QUALIFICATIONS AND EXPERIENCE OF PERSONNEL

Name and Qualifications	Experience
<p>Steve Sass B.App.Sci (Env.Sci) (Hons), Grad.Dip.Cpt.Vert.Mngt Director / Project Manager / Principal Ecologist</p> <p>Certified Environmental Practitioner, EIANZ</p> <p>Practicing Member, Ecological Consultants Association of NSW (ECA)</p> <p>Biobanking & Biocertification Assessor (OEH)</p>	<p>Steve is a highly experienced Ecologist, having undertaken hundreds of ecological surveys and Biodiversity Assessments across Australia since 1992. Steve has an in-depth working knowledge of environmental and biodiversity legislation across all states and territories which allows him to provide detailed and accurate assessments and formulate practical solutions to clients and specific projects.</p> <p>His expertise extends across the widest range of projects including landscape scale biodiversity surveys and flora and fauna impact assessments in sensitive areas such as the recently approved Silverton Wind Farm, Australia's largest Wind Farm with 600 turbines (~30,000 hectares) near Broken Hill in far western New South Wales.</p> <p>Previous and current research holds Steve in high regard within both the scientific and ecological consultants' community. To date, Steve has published, submitted or has in preparation, twenty-nine manuscripts within peer-reviewed scientific journals, most of which are related to threatened species survey, monitoring or management. Steve was recently invited by OEH to become a sitting member of a team to develop Priority Action Statements for two species listed as Endangered under the NSW <i>Threatened Species Conservation Act 1995</i>.</p> <p>Steve is accredited as a Certified Environmental Practitioner by the Environment Institute of Australia and New Zealand, is a past Council member of the Ecological Consultants Association of NSW.</p> <p>For this assessment, Steve was Project Manager, formulated the experimental design, conducted the echolocation call analysis and was the co-author of this report.</p>
<p>Joshua Wellington B. Sc (Environmental) Senior Project Officer / Botanist</p>	<p>Joshua is an experienced Botanist and Field Ecologist having completed surveys in NSW, QLD and VIC since 2008.</p> <p>In the field, Joshua's botanical skills make him a valuable part of the ecological impact assessment team. He is highly conversant with the flora and vegetation communities of NSW and Victoria but his knowledge of plant families and genera enable him to undertake botanical surveys in all states of Australia.</p> <p>Joshua's experience includes the field assessment and reporting for Review of Environmental Factors and Environmental Management Plans for various infrastructure projects within government and private industry.</p> <p>For this study, Joshua carried out the vegetation survey and was co-author of this report.</p>
<p>Simone Harvey B. Sc (Env. Sci; Wildlife and conservation biology) Senior Project Officer / Ecologist</p>	<p>Simone recently joined the EnviroKey team after working with the Australian Research Centre for Urban Ecology at the University of Melbourne. Here, Simone worked on a number of projects including collecting data on the impacts of large infrastructure developments including the Hume Highway duplication in relation to forest and woodland birds, gliding mammals and microchiropteran bats. She has 7 years' experience in conducting biodiversity surveys.</p> <p>For this project, Simone assisted with the field survey and was co-author of this report.</p>
<p>Stephanie Plattner</p>	<p>Stephanie has extensive experience in ArcGIS having worked in</p>

Name and Qualifications	Experience
B.Sc (Spatial Science) GIS Analyst	private industry and government agencies for the past 6 years. Stephanie produced the maps in this report.
Linda Sass Assoc.Deg. Gn.St (Science), B.A, Dip. Ed (Sec) Director / Senior Ecologist Member, Ecological Consultants Association of NSW (ECA)	Linda is an experienced ecologist having conducted flora and fauna surveys across NSW over the past 8 years. Linda has extensive experience with the flora and fauna of southern and western NSW. In recent years, she has completed flora surveys for a proposed water pipeline in western NSW and a biodiversity study of an existing mining operation on the Cobar Penepplain. Linda conducted an internal review of this report.

APPENDIX 2 – PROTECTED MATTERS SEARCH TOOL RESULTS



Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/03/16 15:18:55

[Summary](#)

[Details](#)

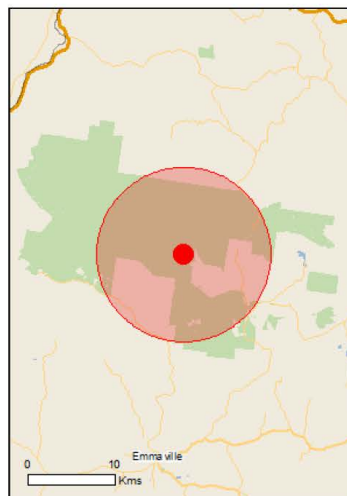
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

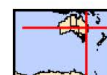
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Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	42
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	22
Nationally Important Wetlands:	None
Key Ecological Features (Marine):	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name		Proximity
Banrock station wetland complex		1100 - 1200km
Riverland		1100 - 1200km
The coorong, and lakes alexandrina and albert wetland		1300 - 1400km

Listed Threatened Ecological Communities

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory	Endangered	Community may occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Erythrorichis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
Mammals		
<u>Chalinolobus dwyeri</u> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
<u>Dasyurus maculatus maculatus (SE mainland population)</u> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
<u>Nyctophilus corbeni</u> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
<u>Petrogale penicillata</u> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
<u>Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</u> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<u>Pseudomys novaehollandiae</u> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
<u>Pteropus poliocephalus</u> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
<u>Acacia macnuttiana</u> McNutt's Wattle [10711]	Vulnerable	Species or species habitat likely to occur within area
<u>Acacia pubifolia</u> Velvet Wattle [19799]	Vulnerable	Species or species habitat likely to occur within area
<u>Acacia ruppii</u> Rupp's Wattle [7559]	Endangered	Species or species habitat likely to occur within area
<u>Almaleea cambagei</u> Torrington Pea [56308]	Vulnerable	Species or species habitat likely to occur within area
<u>Astrotricha roddii</u> [56312]	Endangered	Species or species habitat likely to occur within area
<u>Boronia granitica</u> Granite Boronia [18598]	Endangered	Species or species habitat likely to occur within area
<u>Cadellia pentastylis</u> Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
<u>Callistemon pungens</u> [55581]	Vulnerable	Species or species habitat likely to occur within area
<u>Cryptostylis hunteriana</u> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
<u>Diuris pedunculata</u> Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid [18325]	Endangered	Species or species habitat likely to occur within area
<u>Eucalyptus caleyi subsp. ovendenii</u> Ovenden's Ironbark [56193]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Eucalyptus mckieana McKie's Stringybark [20199]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus nicholii Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat likely to occur within area
Grevillea beadleana Beadle's Grevillea [22002]	Endangered	Species or species habitat likely to occur within area
Homoranthus lunatus [55189]	Vulnerable	Species or species habitat likely to occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Leucopogon confertus Torrington Beard-heath [14417]	Endangered	Species or species habitat likely to occur within area
Phebalium glandulosum subsp. eglandulosum Rusty Desert Phebalium [17140]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Prostanthera staurophylla a mint-bush [20898]	Vulnerable	Species or species habitat likely to occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Delma torquata Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Furina dunmali Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Uvidicolus sphyrurus Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat likely to occur within area
Wollumbinia belli Bell's Turtle, Western Sawshelled Turtle, Namoi River Turtle, Bell's Saw-shelled Turtle [86071]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoaleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Torrington	NSW
UNE Special Management Zone No1	NSW
Regional Forest Agreements	[Resource Information]
Note that all areas with completed RFAs have been included.	
Name	State
North East NSW RFA	New South Wales

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw		Species or species

Name	Status	Type of Presence
Creeper, Funnel Creeper [85119]		habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-29.26212 151.62502

APPENDIX 3 – NOXIOUS WEEDS DATABASE SEARCH

Common Name	Scientific Name
African boxthorn	<i>Lycium ferocissimum</i>
African feather grass	<i>Cenchrus macrourus</i>
African turnip weed - eastern	<i>Sisymbrium thellungii</i>
African turnip weed - western	<i>Sisymbrium runcinatum</i>
Alligator weed	<i>Alternanthera philoxeroides</i>
Anchored water hyacinth	<i>Eichhornia azurea</i>
Annual ragweed	<i>Ambrosia artemisiifolia</i>
Arrowhead	<i>Sagittaria calycina</i> var. <i>calycina</i>
Artichoke thistle	<i>Cynara cardunculus</i>
Asparagus - climbing asparagus fern	<i>Asparagus plumosus</i>
Asparagus - ground asparagus	<i>Asparagus aethiopicus</i>
Asparagus weeds	<i>Asparagus species</i>
Athel pine	<i>Tamarix aphylla</i>
Bear-skin fescue	<i>Festuca gautieri</i>
Bellyache bush	<i>Jatropha gossypifolia</i>
Black knapweed	<i>Centaurea X moncktonii</i>
Black willow	<i>Salix nigra</i>
Blackberry	<i>Rubus fruticosus species aggregate</i>
Boneseed	<i>Chrysanthemoides monilifera subsp. monilifera</i>
Bridal creeper	<i>Asparagus asparagoides</i>
Bridal veil creeper	<i>Asparagus declinatus</i>
Broad-leaf pepper tree	<i>Schinus terebinthifolius</i>
Broomrapes	<i>Orobanche species</i>
Burr - Bathurst burr	<i>Xanthium spinosum</i>
Burr - Californian burr	<i>Xanthium orientale</i>
Burr - Italian cocklebur	<i>Xanthium italicum</i>
Burr - Noogoora burr	<i>Xanthium occidentale</i>
Burr - South American burr	<i>Xanthium cavanillesii</i>
Burr ragweed	<i>Ambrosia confertiflora</i>
Cabomba	<i>Cabomba caroliniana</i>
Cape broom	<i>Genista monspessulana</i>
Cat's claw creeper	<i>Dolichandra unguis-cati</i>
Cayenne snakeweed	<i>Stachytarpheta cayennensis</i>
Chilean needle grass	<i>Nassella neesiana</i>

Common Name	Scientific Name
Chinese celtis	<i>Celtis sinensis</i>
Chinese tallow tree	<i>Triadica sebifera</i>
Chinese violet	<i>Asystasia gangetica subsp. micrantha</i>
Clockweed	<i>Oenothera curtiflora</i>
Columbus grass	<i>Sorghum x alnum</i>
Corn sowthistle	<i>Sonchus arvensis</i>
Dodder	<i>Cuscuta species</i>
Espartillo - broad kernel	<i>Amelichloa caudata</i>
Espartillo - narrow kernel	<i>Amelichloa brachychaeta</i>
Eurasian water milfoil	<i>Myriophyllum spicatum</i>
Fine-bristled burr grass	<i>Cenchrus brownii</i>
Fireweed	<i>Senecio madagascariensis</i>
Flax-leaf broom	<i>Genista linifolia</i>
Fountain grass	<i>Cenchrus setaceus</i>
Frogbit	<i>Limnobium laevigatum</i>
Gallon's curse	<i>Cenchrus biflorus</i>
Gamba grass	<i>Andropogon gayanus</i>
Giant Parramatta grass	<i>Sporobolus fertilis</i>
Giant rat's tail grass	<i>Sporobolus pyramidalis</i>
Giant reed	<i>Arundo donax</i>
Glaucous starthistle	<i>Carthamus leucocaulos</i>
Golden dodder	<i>Cuscuta campestris</i>
Golden thistle	<i>Scolymus hispanicus</i>
Gorse	<i>Ulex europaeus</i>
Green cestrum	<i>Cestrum parqui</i>
Grey willow	<i>Salix cinerea</i>
Groundsel bush	<i>Baccharis halimifolia</i>
Harrisia cactus	<i>Harrisia species</i>
Hawkweeds	<i>Hieracium species</i>
Honey locust	<i>Gleditsia triacanthos</i>
Horsetails	<i>Equisetum species</i>
Hydrocotyl	<i>Hydrocotyle ranunculoides</i>
Hymenachne	<i>Hymenachne amplexicaulis and hybrids</i>
Italian bugloss	<i>Echium italicum</i>

Common Name	Scientific Name
Johnson grass	<i>Sorghum halepense</i>
Karoo thorn	<i>Vachellia karroo</i>
Kidney-leaf mud plantain	<i>Heteranthera reniformis</i>
Kochia	<i>Bassia scoparia</i>
Koster's curse	<i>Clidemia hirta</i>
Kudzu	<i>Pueraria lobata</i>
Lagarosiphon	<i>Lagarosiphon major</i>
Leafy elodea	<i>Egeria densa</i>
Lippia	<i>Phyla canescens</i>
Long-leaf willow primrose	<i>Ludwigia longifolia</i>
Madeira vine	<i>Anredera cordifolia</i>
Mahonia	<i>Berberis lomariifolia</i>
Mesquite	<i>Prosopis species</i>
Mexican feather grass	<i>Nassella tenuissima</i>
Mexican poppy	<i>Argemone mexicana</i>
Miconia	<i>Miconia species</i>
Mikania vine	<i>Mikania micrantha</i>
Mimosa	<i>Mimosa pigra</i>
Mossman River grass	<i>Cenchrus echinatus</i>
Mother-of-millions	<i>Bryophyllum species</i>
Mysore thorn	<i>Caesalpinia decapetala</i>
Pampas grass	<i>Cortaderia species</i>
Parkinsonia	<i>Parkinsonia aculeata</i>
Parthenium weed	<i>Parthenium hysterophorus</i>
Paterson's curse	<i>Echium plantagineum</i>
Pond apple	<i>Annona glabra</i>
Prickly acacia	<i>Vachellia nilotica</i>
Prickly pear - common pear	<i>Opuntia stricta</i>
Prickly pear - Hudson pear	<i>Cylindropuntia rosea</i>
Prickly pear - smooth tree pear	<i>Opuntia monacantha</i>
Prickly pear - tiger pear	<i>Opuntia aurantiaca</i>
Prickly pear - velvety tree pear	<i>Opuntia tomentosa</i>
Privet - broad-leaf	<i>Ligustrum lucidum</i>
Privet - narrow-leaf	<i>Ligustrum sinense</i>

Common Name	Scientific Name
Red rice	<i>Oryza rufipogon</i>
Rhus tree	<i>Toxicodendron succedaneum</i>
Rubber vine	<i>Cryptostegia grandiflora</i>
Sagittaria	<i>Sagittaria platyphylla</i>
Salvinia	<i>Salvinia molesta</i>
Scotch broom	<i>Cytisus scoparius subsp. scoparius</i>
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>
Serrated tussock	<i>Nassella trichotoma</i>
Siam weed	<i>Chromolaena odorata</i>
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>
Smooth-stemmed turnip	<i>Brassica barrelieri subsp. oxyrrhina</i>
Soldier thistle	<i>Picnomon acarna</i>
Spongeplant	<i>Limnobia spongia</i>
Spotted knapweed	<i>Centaurea stoebe subsp. micranthos</i>
St. John's wort	<i>Hypericum perforatum</i>
Sweet briar	<i>Rosa rubiginosa</i>
Texas blueweed	<i>Helianthus ciliaris</i>
Tropical soda apple	<i>Solanum viarum</i>
Viper's bugloss	<i>Echium vulgare</i>
Water caltrop	<i>Trapa species</i>
Water hyacinth	<i>Eichhornia crassipes</i>
Water lettuce	<i>Pistia stratiotes</i>
Water soldier	<i>Stratiotes aloides</i>
Willows	<i>Salix species</i>
Witchweeds	<i>Striga species</i>
Yellow bells	<i>Tecoma stans</i>
Yellow burrhead	<i>Limnocharis flava</i>
Yellow nutgrass	<i>Cyperus esculentus</i>

APPENDIX 4 – FLORA SPECIES RECORDED DURING THE FIELD SURVEY

(Y)= Recorded Scientific Name	Common Name	Family	Incidental	T1	T2	T3	T4	T5	T6	T7	T8
Native Species											
<i>Acacia filicifolia</i>	Fern-leaved Wattle	Fabaceae				Y				Y	
<i>Acacia fimbriata</i>	Fringed Wattle	Fabaceae		Y			Y				
<i>Acacia penninervis</i>	Hickory	Fabaceae					Y	Y		Y	Y
<i>Allocasuarina littoralis</i>	Black she-oak	Casuarubaceae							Y		
<i>Angophora floribunda</i>	Rough-barked Apple	Myrtaceae							Y		
<i>Amyema miquelii</i>	Box Mistletoe	Loranthaceae									
<i>Austrostipa sp.</i>	Speargrass	Poaceae		Y							
<i>Billardiera scandens</i>	Hairy Apple Berry	Pittosporaceae					Y			Y	
<i>Blechnum cartilagineum</i>	Gristle Fern	Blechnaceae	Y								
<i>Bossiaea prostrata</i>	Creeping Bossiaea	Fabaceae		Y						Y	
<i>Caladenia fuscata</i>	Dusky Fingers	Orchidaceae	Y					Y		Y	
<i>Callistemon pallidus</i>	Lemon Bottlebrush	Myrtaceae									Y
<i>Calochlaena dubia</i>	Rainbow Fern	Dicksoniaceae	Y								Y
<i>Carex sp.</i>	Sedge	Cyperaceae									Y
<i>Centella asiatica</i>	Indian Pennywort	Apiaceae									Y
<i>Cheilanthes distans</i>	Bristly Cloak Fern	Pteridaceae						Y	Y		
<i>Clematis glycinoides</i>	Headache Vine	Ranunculaceae								Y	
<i>Cyanicula caerulea</i>	Blue Caladenia	Orchidaceae	Y								
<i>Daviesia genistifolia</i>	Broom Bitter Pea	Fabaceae	Y								
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae		Y	Y	Y	Y	Y	Y	Y	

(Y)= Recorded Scientific Name	Common Name	Family	Incidental	T1	T2	T3	T4	T5	T6	T7	T8
<i>Drosera sp.</i>	Sundew	Droseraceae				Y					
<i>Echinopogon sp.</i>	Hedgehog Grass	Poaceae						Y	Y	Y	
<i>Epacris microphylla</i>	Coast Coral Heath	Ericaceae		Y		Y					
<i>Eragrostis sp.</i>	Lovegrass	Poaceae								Y	
<i>Eucalyptus andrewsii</i>	New England Blackbutt	Myrtaceae		Y	Y		Y		Y	Y	
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Myrtaceae							Y		Y
<i>Eucalyptus bridgesiana</i>	Apple Box	Myrtaceae		Y				Y			
<i>Eucalyptus brunnea</i>	Brown Gum	Myrtaceae					Y			Y	
<i>Eucalyptus caliginosa</i>	Broad-leaved Stringybark	Myrtaceae		Y	Y				Y		
<i>Eucalyptus dalrympleana subsp. heptantha</i>	Mountain Gum	Myrtaceae	Y								
<i>Eucalyptus laevopinea</i>	Silvertop Stringybark	Myrtaceae				Y				Y	
<i>Eucalyptus melliodora</i>	Yellow Box	Myrtaceae		Y	Y			Y	Y		Y
<i>Eucalyptus youmanii</i>	Youman's stringybark	Myrtaceae	Y				Y				
<i>Euchiton sphaericus</i>	Cudweed	Asteraceae			Y			Y	Y	Y	Y
<i>Entolasia stricta</i>	Wiry Panic	Poaceae									Y
<i>Galium (?) leiocarpum</i>	Galium	Rubiaceae		Y	Y		Y	Y	Y	Y	Y
<i>Gleichenia dicarpa</i>	Pouched Coral Fern	Gleicheniaceae	Y								
<i>Glossodia major</i>	Waxlip Orchid	Orchidaceae	Y								
<i>Glycine tabacina</i>	Twining Glycine	Fabaceae		Y			Y	Y		Y	Y
<i>Goodenia hederacea</i>	Forest Goodenia	Goodeniaceae				Y	Y				

(Y)= Recorded Scientific Name	Common Name	Family	Incidental	T1	T2	T3	T4	T5	T6	T7	T8
<i>Haloragis heterophylla</i>	Rough Raspwort	Haloragaceae				Y			Y		Y
<i>Hardenbergia violacea</i>	Purple Coral Pea	Fabaceae								Y	
<i>Hibbertia obtusifolia</i>	Hoary guinea flower	Dilleniaceae	Y	Y	Y				Y		Y
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Apiaceae			Y	Y	Y		Y		Y
<i>Hypericum gramineum</i>	Small St. John's Wort	Clusiaceae		Y	Y		Y	Y	Y	Y	
<i>Imperata cylindrica</i>	Blady Grass	Poaceae		Y						Y	
<i>Juncus sp.</i>	Rush	Juncaceae			Y	Y			Y		Y
<i>Leptospermum novae-angliae</i>		Myrtaceae								Y	
<i>Leucopogon melaleucoides</i>	Beard-heath	Ericaceae		Y							
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Lomandraceae		Y	Y	Y	Y	Y	Y	Y	
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	Lomandraceae		Y							
<i>Lomatia silaifolia</i>	Crinkle Bush	Proteaceae									Y
<i>Melichrus urceolatus</i>	Urn-heath	Ericaceae						Y			
<i>Mentha satureioides</i>	Creeping Mint	Lamiaceae							Y		
<i>Microlaena stipoides</i>	Weeping Grass	Poaceae		Y	Y	Y	Y	Y	Y	Y	Y
<i>Opercularia aspera</i>	Coarse Stinkweed	Rubiaceae		Y			Y	Y		Y	
<i>Oxalis perrenans</i>	Oxalis	Oxalidaceae		Y	Y			Y	Y	Y	Y
<i>Parsonsia straminea</i>	Common Silkpod	Apocynaceae	Y								

(Y)= Recorded Scientific Name	Common Name	Family	Incidental	T1	T2	T3	T4	T5	T6	T7	T8
<i>Patersonia sericea</i>	Silky Purple-flag	Iridaceae	Y								
<i>Persoonia cornifolia</i>	Persoonia	Proteaceae									Y
<i>Pimelea neo-anglica</i>	Poison Pimelea	Thymelaeaceae			Y				Y	Y	
<i>Poa sieberiana</i> var. <i>sieberiana</i>	Tussock Grass	Poaceae		Y	Y	Y	Y	Y	Y	Y	Y
<i>Poa</i> sp.	Tussock Grass	Poaceae				Y					
<i>Poranthera microphylla</i>	Small-leaved Poranthera	Phyllanthaceae								Y	
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	Asteraceae								Y	Y
<i>Pteridium esculentum</i>	Common Bracken	Dennstaedtiaceae		Y						Y	
<i>Pterostylis nutans</i>	Nodding Greenhood	Orchidaceae					Y				
<i>Ranunculus lappaceus</i>	Common Buttercup	Ranunculaceae	Y			Y		Y		Y	Y
<i>Rytidosperma tenuius</i>	Wallaby Grass	Poaceae	Y								
<i>Senecio tenuiflorus</i>	Groundsel	Asteraceae							Y	Y	
<i>Solanum amblymerum</i>	Solanum	Solanaceae						Y	Y		
<i>Solenogyne</i> sp.	Solenogyne	Asteraceae			Y		Y	Y			
<i>Themeda australis</i>	Kangaroo Grass	Poaceae				Y					
<i>Veronica plebeia</i>	Trailing Speedwell	Plantaginaceae									Y
<i>Veronica</i> sp.	Speedwell	Plantaginaceae							Y		
<i>Viola betonicifolia</i>	Native Violet	Violaceae		Y	Y				Y		
<i>Wurmbea dioica</i>	Early Nancy	Colchicaceae				Y					

(Y)= Recorded Scientific Name	Common Name	Family	Incidental	T1	T2	T3	T4	T5	T6	T7	T8
<i>Xanthorrhoea johnsonii</i>	Johnson's grass tree	Xanthorrhoeaceae	Y								
Introduced Species											
<i>Cirsium vulgare</i>	Spear Thistle	Asteraceae			Y						Y
<i>Hypochaeris radicata</i>	Catsear	Asteraceae					Y	Y	Y	Y	
<i>Taraxacum officinale</i>	Dandelion	Asteraceae									Y

APPENDIX 5 – FAUNA SPECIES RECORDED DURING THE FIELD SURVEY

TAXA	COMMON NAME	SCIENTIFIC NAME
Amphibia	Beeping froglet	<i>Crinia parinsignifera</i>
Amphibia	Clicking froglet	<i>Crinia signifera</i>
Amphibia	Eastern Gungan	<i>Uperoleia laevisgata</i>
Amphibia	Eastern pobblebonk	<i>Limnodynastes dumerillii</i>
Amphibia	Emerald-spotted Tree Frog	<i>Litoria peronii</i>
Amphibia	Whistling tree frog	<i>Litoria verreauxii</i>
Aves	Australasian Darter	<i>Anhinga novaehollandiae</i>
Aves	Australasian Grebe	<i>Tachybaptus novaehollandiae</i>
Aves	Australian King-Parrot	<i>Alisterus scapularis</i>
Aves	Australian Magpie	<i>Cracticus tibicen</i>
Aves	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
Aves	Brown Thornbill	<i>Acanthiza pusilla</i>
Aves	Brown Treecreeper	<i>Climacteris picumnus</i>
Aves	Common Bronzewing	<i>Phaps chalcoptera</i>
Aves	Crested Shrike-tit	<i>Falcunculus frontatus</i>
Aves	Crimson Rosella	<i>Platycercus elegans</i>
Aves	Dusky Moorhen	<i>Gallinula tenebrosa</i>
Aves	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
Aves	Eastern Yellow Robin	<i>Eopsaltria australis</i>
Aves	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>
Aves	Grey Fantail	<i>Rhipidura albiscapa</i>
Aves	Grey Shrike-thrush	<i>Colluricincla harmonica</i>
Aves	Grey Teal	<i>Anas gracilis</i>
Aves	Hooded Robin	<i>Melanodryas cucullata</i>
Aves	Jacky Winter	<i>Microeca fascinans</i>
Aves	Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Aves	Leaden Flycatcher	<i>Myiagra rubecula</i>
Aves	Noisy Friarbird	<i>Philemon corniculatus</i>
Aves	Pacific Black Duck	<i>Anas superciliosa</i>
Aves	Pied Currawong	<i>Strepera graculina</i>
Aves	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Aves	Red Wattlebird	<i>Anthochaera carunculata</i>
Aves	Red-browed Treecreeper	<i>Climacteris erythrops</i>
Aves	Restless Flycatcher	<i>Myiagra inquieta</i>
Aves	Rufous Fantail	<i>Rhipidura rufifrons</i>

TAXA	COMMON NAME	SCIENTIFIC NAME
Aves	Rufous Whistler	<i>Pachycephala rufiventris</i>
Aves	Sacred Kingfisher	<i>Todiramphus sanctus</i>
Aves	Scarlet Robin	<i>Petroica boodang</i>
Aves	Southern Boobook	<i>Ninox novaeseelandiae</i>
Aves	Spotted Pardalote	<i>Pardalotus punctatus</i>
Aves	Striated Thornbill	<i>Acanthiza lineata</i>
Aves	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>
Aves	Superb Fairy-wren	<i>Malurus cyaneus</i>
Aves	Varied Sittella	<i>Daphoenositta chrysoptera</i>
Aves	Welcome Swallow	<i>Hirundo neoxena</i>
Aves	White-browed Scrubwren	<i>Sericornis frontalis</i>
Aves	White-browed Treecreeper	<i>Climacteris affinis</i>
Aves	White-eared Honeyeater	<i>Lichenostomus leucotis</i>
Aves	White-faced Heron	<i>Egretta novaehollandiae</i>
Aves	White-naped Honeyeater	<i>Melithreptus lunatus</i>
Aves	White-necked Heron	<i>Ardea pacifica</i>
Aves	White-throated Gerygone	<i>Gerygone albogularis</i>
Aves	White-throated Treecreeper	<i>Cormobates leucophaea</i>
Aves	White-winged Chough	<i>Corcorax melanorhamphos</i>
Aves	Willie Wagtail	<i>Rhipidura leucophrys</i>
Aves	Wonga Pigeon	<i>Leucosarcia picata</i>
Aves	Yellow Thornbill	<i>Acanthiza nana</i>
Aves	Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>
Mammalia	Common Brushtail Possum	<i>Trichosurus vulpecula</i>
Mammalia	Eastern Grey Kangaroo	<i>Macropus giganteus</i>
Mammalia	Fox	<i>Vulpes vulpes</i>
Mammalia	Pig	<i>Sus scrofa</i>
Mammalia	Rabbit	<i>Oryctolagus cuniculus</i>
Mammalia	Red-necked Wallaby	<i>Macropus rufogriseus</i>
Mammalia	Sugar Glider	<i>Petaurus breviceps</i>
Mammalia	Swamp Wallaby	<i>Wallabia bicolor</i>
Mammalia	White-striped free-tailed bat	<i>Austronomus australis</i>
Mammalia	Wombat	<i>Vombatus ursinus</i>
Reptilia	lemon-barred forest-skink	<i>Eulamprus</i>
Reptilia	Unknown	<i>Scincidae</i>

		Survey Number																No. of surveys present
Common Name	Scientific Name	1	2	3	4	5	6	7	8	9	10	11	12	13	N	I		
Australasian Darter	<i>Anhinga novaehollandiae</i>															P	1	
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>												P			P	2	
Australian King-Parrot	<i>Alisterus scapularis</i>															P	1	
Australian Magpie	<i>Cracticus tibicen</i>															P	1	
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>													P		P	2	
Brown Thornbill	<i>Acanthiza pusilla</i>			P				P									2	
Brown Treecreeper	<i>Climacteris picumnus</i>															P	1	
Common Bronzewing	<i>Phaps chalcoptera</i>															P	1	
Crested Shrike-tit	<i>Falcunculus frontatus</i>						P							P			2	
Crimson Rosella	<i>Platycercus elegans</i>	P		P	P	P		P	P			P	P				8	
Dusky Moorhen	<i>Gallinula tenebrosa</i>												P			P	2	
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	P	P	P	P	P	P	P			P	P	P				10	
Eastern Yellow Robin	<i>Eopsaltria australis</i>	P	P			P	P			P	P						6	
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>															P	1	

Grey Fantail	<i>Rhipidura albiscapa</i>	P		P	P						P	P		P		P	7
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	P					P		P	P		P		P		P	7
Grey Teal	<i>Anas gracilis</i>															P	1
Hooded Robin	<i>Melanodryas cucullata</i>															P	1
Jacky Winter	<i>Microeca fascinans</i>															P	1
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	P	P				P	P		P							5
Leaden Flycatcher	<i>Myiagra rubecula</i>															P	1
Noisy Friarbird	<i>Philemon corniculatus</i>						P	P	P		P	P		P	P		8
Pacific Black Duck	<i>Anas superciliosa</i>						P									P	2
Pied Currawong	<i>Strepera graculina</i>										P		P	P		P	4
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>															P	1
Red Wattlebird	<i>Anthochaera carunculata</i>							P				P		P			3
Red-browed Treecreeper	<i>Climacteris erythrops</i>															P	1
Restless Flycatcher	<i>Myiagra inquieta</i>												P				1
Rufous Fantail	<i>Rhipidura rufifrons</i>															P	1
Rufous Whistler	<i>Pachycephala rufiventris</i>							P				P		P			3
Sacred Kingfisher	<i>Todiramphus sanctus</i>															P	1

Scarlet Robin	<i>Petroica boodang</i>															P	1
Southern Boobook	<i>Ninox novaeseelandiae</i>															P	1
Spotted Pardalote	<i>Pardalotus punctatus</i>		P		P				P	P	P	P	P	P			8
Striated Thornbill	<i>Acanthiza lineata</i>						P			P	P	P	P				5
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	P											P				2
Superb Fairy-wren	<i>Malurus cyaneus</i>				P	P	P	P		P	P		P				7
Varied Sittella	<i>Daphoenositta chrysoptera</i>						P									P	2
Welcome Swallow	<i>Hirundo neoxena</i>					P											1
White-browed Scrubwren	<i>Sericornis frontalis</i>						P		P						P		3
White-browed Treecreeper	<i>Climacteris affinis</i>		P										P				2
White-eared Honeyeater	<i>Lichenostomus leucotis</i>						P						P				2
White-faced Heron	<i>Egretta novaehollandiae</i>					P							P				2
White-naped Honeyeater	<i>Melithreptus lunatus</i>					P							P			P	3
White-necked Heron	<i>Ardea pacifica</i>															P	1
White-throated Gerygone	<i>Gerygone albogularis</i>												P				1
White-throated Treecreeper	<i>Cormobates leucophaea</i>	P		P	P	P		P	P				P			P	8
White-winged Chough	<i>Corcorax melanorhamphos</i>			P	P												2

Willie Wagtail	<i>Rhipidura leucophrys</i>					P							P				2
Wonga Pigeon	<i>Leucosarcia picata</i>								P							P	2
Yellow Thornbill	<i>Acanthiza nana</i>			P													1
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>		P						P		P	P		P		P	6
	No. of species detected in survey	8	6	7	7	11	11	8	7	8	8	11	17	10	1	29	

Appendix 3

Cultural Heritage Assessment

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R.W. Corkery & Co. Pty. Limited

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Proposed Exploration Program for the Torrington Tungsten and Topaz Project

LGA: Tenterfield

Aboriginal Heritage Due Diligence Assessment

9 May 2016


McCARDLE CULTURAL HERITAGE PTY LTD

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Report No: J16011	
Approved by:	Penny McCardle
Position:	Director
Signed:	
Date:	9 May 2016

This report has been prepared in accordance with the scope of services described in the contract or agreement between McCardle Cultural Heritage Pty Ltd (MCH), ACN: 104 590 141, ABN: 89 104 590 141, and R.W. Corkery & Co. Pty Limited. The report relies upon data, surveys, measurements and specific times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by and R.W. Corkery & Co. Pty Limited. Furthermore, the report has been prepared solely for use by and R.W. Corkery & Co. Pty Limited and MCH accepts no responsibility for its use by other parties.

CONTENTS

EXECUTIVE SUMMARY	1
GLOSSARY	3
ACRONYMS	4
OEH AHIMS SITE ACRONYMS	4
1 INTRODUCTION.....	5
1.1 INTRODUCTION	5
1.2 THE PROJECT AREA.....	5
1.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT.....	6
1.4 OBJECTIVES OF THE DUE DILIGENCE ASSESSMENT.....	8
1.5 LEGISLATIVE CONTEXT	9
1.5.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED).....	9
1.5.2 NATIONAL PARKS AND WILDLIFE REGULATION (2009).....	10
1.5.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A Act)	10
1.6 ABORIGINAL COMMUNITY CONSULTATION	11
1.7 QUALIFICATIONS OF THE INVESTIGATOR	11
1.8 REPORT STRUCTURE	11
2 ENVIROMNEMATL AND ARCHAEOLOGICAL CONTEXT	12
2.1 LOCAL ENVIRONMENT	12
2.2 ARCHAEOLOGICAL CONTEXT	13
2.2.1 OEH ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS)	13
2.2.2 HERITAGE REGISTER LISTINGS	14
2.2.3 SUMMARY OF THE ARCHAEOLOGICAL CONTEXT	15
2.3 SYNTHESIS OF ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXTS.....	20
2.4 PREDICTIVE MODEL FOR THE PROJECT AREA	21
2.5 MODELS OF PAST ABORIGINAL LAND USE	22
3 RESULTS AND DISCUSSION	25
3.1.1 SU1: QUARRY.....	26
3.1.2 SU2: SLOPES	26
3.1.3 SU3: QUARRY.....	27
3.1.4 SU4 SLOPES	27
3.1.5 SU5: CREST.....	28
3.1.6 SU6: SLOPES	28

3.2	DISCUSSION.....	29
3.3	INTERPRETATION & OCCUPATION MODEL	30
3.4	REGIONAL & LOCAL CONTEXT	30
3.5	REASSESSMENT OF THE PREDICTIVE MODEL.....	30
3.6	CONCLUSION	30
4	ASSESSMENT OF IMPACTS	31
4.1	IMPACTS.....	31
4.2	CUMULATIVE IMPACTS	31
5	MITIGATION AND MANAGEMENT STRATEGIES	32
5.1	CONSERVATION/PROTECTION	32
5.2	FURTHER INVESTIGATION	32
5.3	AHIP	32
6	RECOMMENDATIONS.....	33
6.1	GENERAL	33

APPENDICES

APPENDIX A AHIMS SEARCH RESULTS

LIST OF TABLES

TABLE 2.1	SUMMARY OF AHIMS RESULTS	14
TABLE 2.2	SUMMARY OF SITES (ENGLISH 1998).....	16
TABLE 2.3	SUMMARY OF PADs (ENGLISH 1998).....	18
TABLE 2.4	SITE TYPE IN RELATION TO LANDFORM AND WATER	19
TABLE 2.5	SITE DESCRIPTIONS (KUSKIE & KAMMINGA 2000)	24
TABLE 3.1	EFFECTIVE COVERAGE FOR THE INVESTIGATION AREA	29

LIST OF FIGURES

FIGURE 1.1	REGIONAL LOCATION OF THE PROJECT AREA	5
FIGURE 1.2	LOCAL LOCATION OF THE PROJECT AREA	6
FIGURE 1.3	PROPOSED EXPLORATION LOCATION.....	7
FIGURE 2.1	LANDFORMS OF THE INVESTIGATION AREA.....	12
FIGURE 2.2	KNOWN SITES.....	14
FIGURE 2.3	FOLEY'S MODEL (L) AND ITS MANIFESTATION IN THE ARCHAEOLOGICAL RECORD (R), (FOLEY 1981).....	23
FIGURE 3.1	SURVEY UNITS	25
FIGURE 3.2	ENTRANCE TO QUARRY (SU1).....	26
FIGURE 3.3	QUARRY STOCKPILE (SU1)	26
FIGURE 3.4	SU2 FACING SOUTH	26
FIGURE 3.5	SU2 FACING WEST	26

FIGURE 3.6 QUARRY (SU3)27

FIGURE 3.7 SU4 FACING EAST.....27

FIGURE 3.8 SU4 FACING NORTH27

FIGURE 3.9 SU5 FACING SOUTH28

FIGURE 3.10 SU6 FACING NORTH28

FIGURE 3.11 SU6 FACING NORTH28

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EXECUTIVE SUMMARY

McCardle Cultural Heritage Pty Ltd (MCH) was commissioned by and R.W. Corkery & Co. Pty Limited to undertake an Archaeological Due Diligence Assessment for the Torrington Tungsten and Topaz Project, located at Torrington, northern New South Wales. The assessment was undertaken to meet the NSW Office of Environment and Heritage (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010), the OEH Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and the brief.

The project area, located approximately four kilometres northwest of Torrington, consists of three components: northern, southern and middle. Highland Home Creek (3rd order) is situated along the far southern boundary of the investigation area and Burnt Hill Creek (2nd Order) is situated along the far northern border with no drainage or water sources in the investigation area. The investigation area is situated in between these two water sources. The northern component of the investigation area encompasses slopes and an abandoned quarry (disturbed landform), the middle component includes very low gentle slopes to flats and the southern component includes a small crest, slopes and an abandoned quarry. Past land uses include clearing, tracks, quarrying, and animals (pigs and kangaroos) as well as erosion. Additionally, significant bushfires in 2009 and 2015 have occurred within the investigation area resulting in significant loss of large old trees that may have been present (scar/carved trees).

The project area is located within an environment that provided fauna and flora and limited raw materials for tool manufacture and the most reliable water sources, that are necessary for camping, are to the north and south of the investigation area. The flora and fauna availability and the projects' location in between two water sources, suggests the investigation area would have been utilised for hunting and/or gathering and travel in between the two water sources. In relation to alterations to the landscape, the landscape and any associated cultural materials are expected to have been disturbed and damaged by natural processes as well as land clearing, construction of fire trails, introduced animals, quarrying and bushfires.

A search of the OEH AHIMS register indicate there are 17 known Aboriginal sites are currently recorded within a 10 kilometre radius of the project area and include 14 artefact sites, two art sites and one artefact/art site. No sites are located in the investigation area and there are no Aboriginal Places that have been declared within the 10km radius search area.

Based on the one assessment undertaken within the 10 kilometre radius (English 1998) and the AHIMS results, a predictive model was established. Low density artefact scatters and isolated finds are by far the most common site type and a variety of other site types have been identified in far lower concentrations and include, rock shelters with occupation, shelters with art and a scar tree. The high representation of sites containing stone artefacts is to be expected due to the durability of stone in comparison to other raw materials. Raw materials used for tool manufacture include quartz and mudstone which are the most common lithic artefactual material found in the region. The most common stone artefacts include flakes, flake fragments and flaked pieces. Cores, edge ground axes, millstones, grindstones, hammer stones and backed artefacts also occur though in lower frequencies. Proximity to reliable water was essential for past occupation.

High and moderate density artefact scatters are a common site type in the broader region in direct association with reliable water sources and subsistence resources and reduce in density and numbers with distance from such resources. As camping without reliable water was not suitable,

low density artefact scatters and/or isolated artefacts appear to be present within areas at distance from such resources and are indicative of travel and/or hunting/gathering past Aboriginal land uses.

As the investigation area is situated within two water sources, the actual investigation area would have been utilised for travel and/or hunting/gathering in between these two water sources. There is potential for low density artefact scatters and/or isolated finds to occur within the investigation area and sites are expected to be fewer, all of which area typically interpreted as being indicative of travel routes and/or hunting/gathering grounds. There is also the potential for such sites to be impacted on through past land uses including previous clearing, quarrying, erosion, tracks and bushfires. The likelihood of discovering scarred/carved trees in the project area is assessed as being very low, due primarily to a number of natural fires, but cannot be discounted.

The total effective coverage for the project area was 1,588,400 m², or 4.01% reflecting the low surface visibility due to leaf litter, grass and fallen trees. The disturbances included quarries, erosion, tracks, bushfires and animal impacts (pigs and kangaroos), all of which have impacted upon the landscape and associated cultural materials. No sites or PADs were identified within the investigation area.

The level and nature of the effective survey coverage is considered satisfactory to provide an effective assessment of the Aboriginal sites identified and those potentially present within the investigation area. The coverage was very comprehensive for obtrusive site types (e.g. grinding grooves and scarred trees) but limited for the less obtrusive surface stone artefact sites by surface visibility constraints that included vegetation cover and minimal exposures.

It is concluded that proximity to water was an important factor in past occupation of the local area, with sites reducing in number significantly away from water with most sites located within 50 metres of reliable water sources and on elevated land. The absence of reliable water and subsistence resources rendered the investigation area unsuitable for sustainable occupation, but may have been utilised for travel and/or hunting/gathering land uses. The impacts from past land uses and natural factors reduce the likelihood of in situ cultural materials to remain.

The following recommendations are made:

- 1) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974; and
- 2) If an Aboriginal site is identified during any works, works must cease in that location immediately and the Environmental Line notified (131 555).

GLOSSARY

Aboriginal Site: an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

Artefact: any object that is physically modified by humans.

Artefact scatter: a collection of artefacts scattered across the surface of the ground (also referred to as open camp sites).

Assemblage: a collection of artefacts associated by a particular place or time, assumed generated by a single group of people, and can comprise different artefact types.

Background scatter: a term used to describe low density scatter of isolated finds that are distributed across the landscape without any obvious focal point.

Contact site: a site that displays interaction between early colonists and Aboriginal Australians.

Debitage: small pieces of stone debris that break off during the manufacturing of stone tools. These are usually considered waste and are the by product of production (also referred to as flake piece).

Formation processes: human caused (land uses etc) or natural processes (geological, animal, plant growth etc) by which an archaeological site is modified during or after occupation and abandonment. These processes have a large effect on the provenience of artefacts or features.

Harm: is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

Stratified Archaeological Deposits: layers detected within the soil or sediments that are attributable to separate depositional events in the past, the deposit is said to be stratified. The integrity of sediments and soils are usually affected by 200 years of European settlement and activities such as land clearing, cultivation and construction of industrial, commercial and residential developments.

Taphonomy: the study of processes which have affected organic materials such as bone after death; it also involves the microscopic analysis of tooth-marks or cut marks to assess the effects of butchery or scavenging activities.

Typology: the systematic organization of artefacts into types on the basis of shared attributes.

ACRONYMS

ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System. Data base of recorded sites across NSW managed by OEH
OEH	Office of Environment and Heritage

OEH AHIMS SITE ACRONYMS

ACD	Aboriginal ceremonial and dreaming
AFT	Artefact (stone, bone, shell, glass, ceramic and metal)
ARG	Aboriginal resource and gathering
ART	Art (pigment or engraving)
BOM	Non-human bone and organic material
BUR	Burial
CFT	Conflict site
CMR	Ceremonial ring (stone or earth)
ETM	Earth mound
FSH	Fish trap
GDG	Grinding groove
HAB	Habitation structure
HTH	Hearth
OCQ	Ochre quarry
PAD	Potential archaeological deposit.
SHL	Shell
STA	Stone arrangement
STQ	Stone quarry
TRE	Modified tree (carved or scarred)
WTR	Water hole

1 INTRODUCTION

1.1 INTRODUCTION

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by and R.W. Corkery & Co. Pty Limited to undertake an Archaeological Due Diligence Assessment for the Torrington Tungsten and Topaz Project, located at Torrington, northern New South Wales.

The assessment has been undertaken to meet the NSW Office of Environment and Heritage (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010), the OEH Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and the brief.

The purpose of a due diligence assessment is to assist proponents to exercise due diligence when carrying out activities that may harm Aboriginal objects or Aboriginal places and to determine whether that should apply for a consent to harm Aboriginal objects or Places through an Aboriginal Heritage Impact Assessment (AHIP). The purpose of this due diligence report is to demonstrate that all reasonable and practicable measures have been undertaken to prevent harm to any Aboriginal objects and/or place within the project area. This report has met the requirements and considered the relevant environmental and archaeological information, the project land condition, the nature of the proposed development activity and impacts, as well as preparing appropriate recommendations.

1.2 THE PROJECT AREA

The project area (Figure 1.1 and 1.2) is located approximately 1.2 kilometres west of Tungsten, approximately four kilometres northwest of Torrington, NSW. The investigation area consists of three components: northern, southern and middle.

Figure 1.1 regional location of the project area

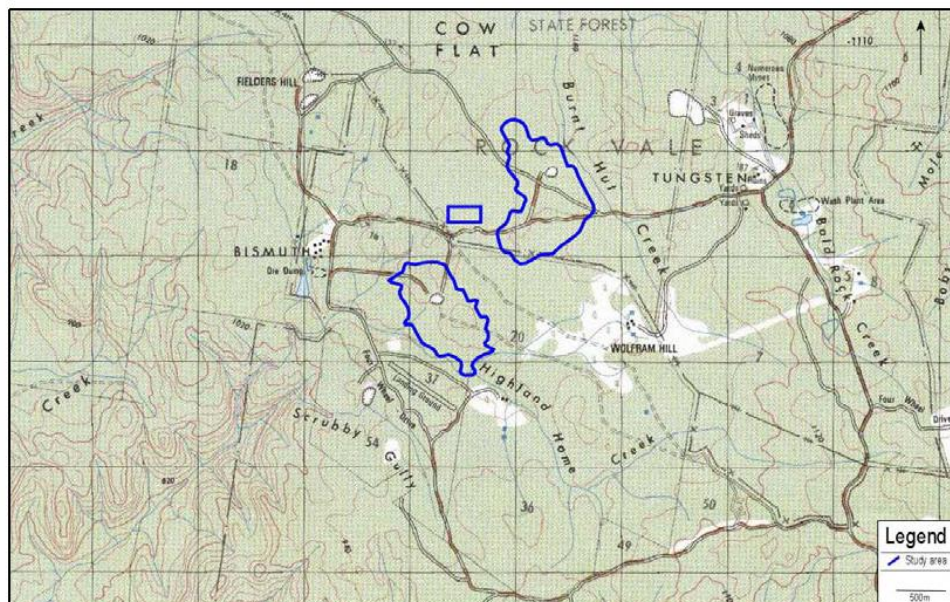
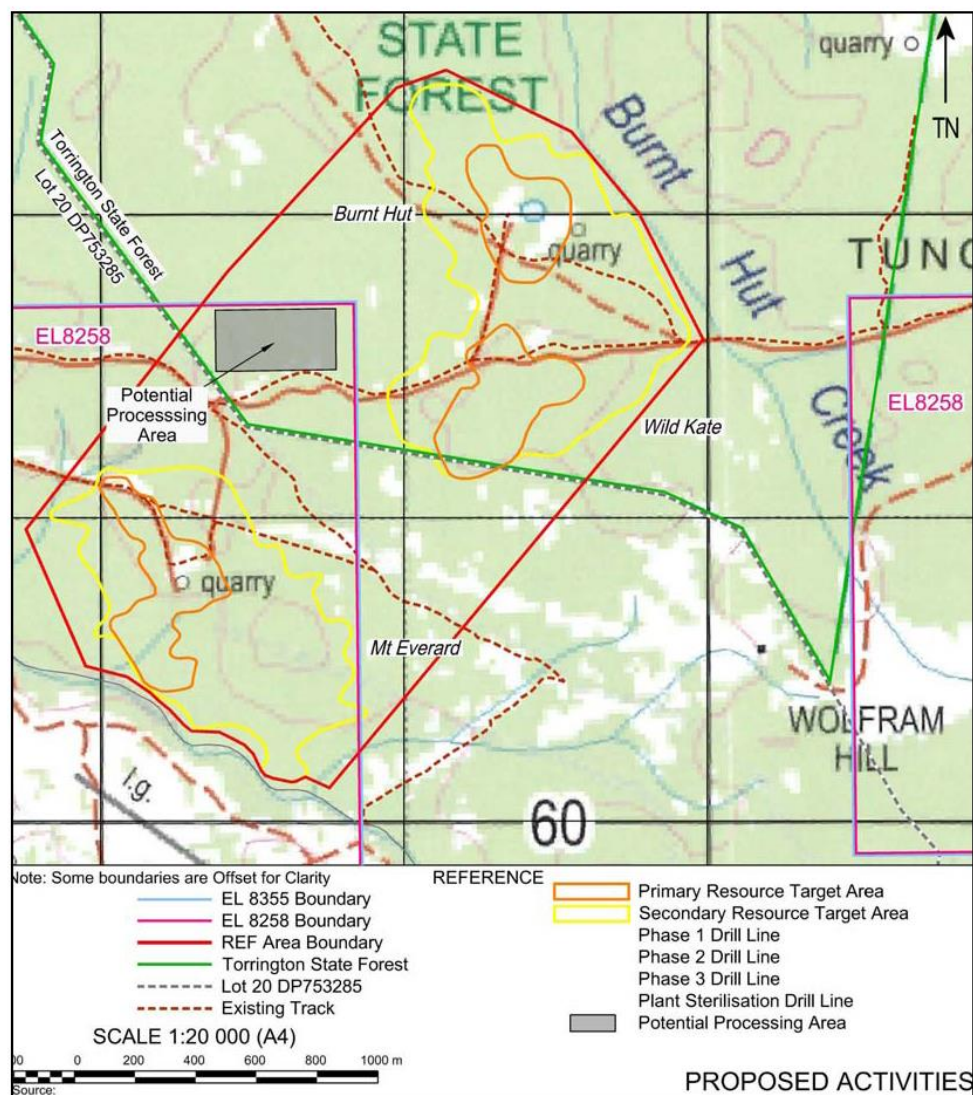


Figure 1.2 Local location of the project area



1.3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposal is for exploration for the Torrington, Tungsten and Topaz project. It is proposed to increase the existing JORC resources of ~5,000t of tungsten within this area to about 12,000t, which is the resource base required to develop a small-scale (500,000tpa) quarry and processing plant.

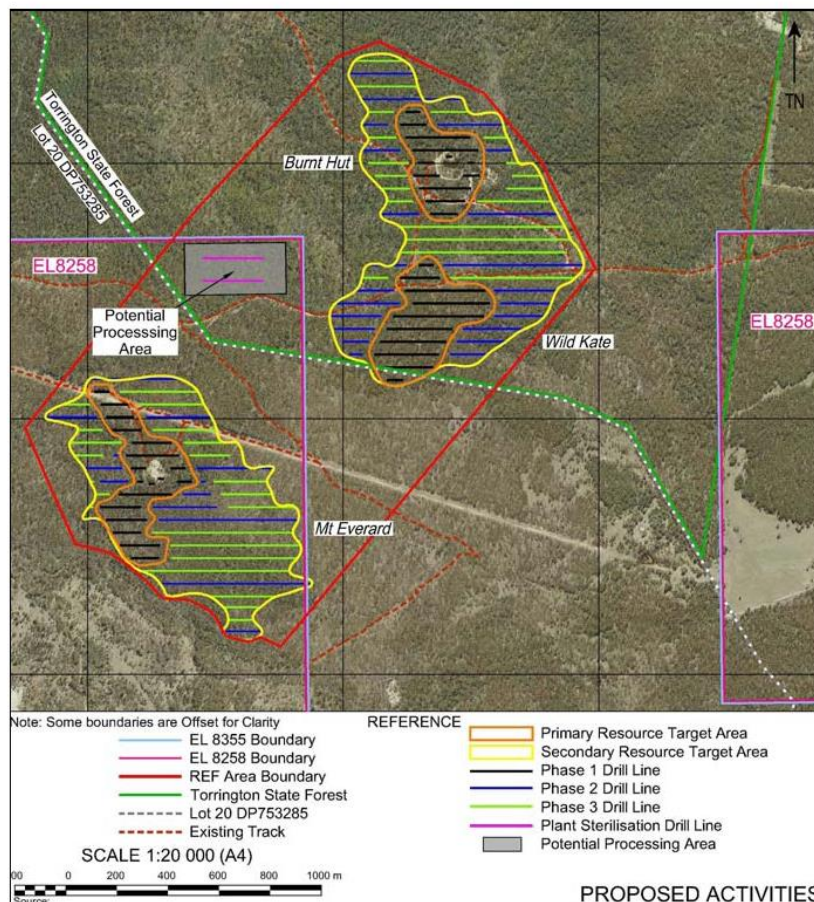
The objectives of the proposed activities are to:

- further develop the geological understanding of the Mt Everard and Wild Kate / Burnt Hut Identification Areas, with a view to preparing a JORC Code-compliant resource estimate statement;
- increase the existing JORC Code estimated resource from ~5 000t to between 10 000t and 15 000 of WO₃ (tungsten oxide);
- undertake sterilisation drilling of potential infrastructure areas, in particular the potential processing area.

To achieve this, the proponent proposes to drill between 15 000 to 17 000m shallow drill holes using a combination of reverse circulation percussion (RC) and diamond drilling core (DC) methods within the REF Area. Individual holes are expected to be a maximum 30 m deep based on previous work, but may be up to 50m deep). It is expected that in the order of 35% of the holes would be DC. Drilling will be undertaken in three stages as follows and illustrated in Figure 1.3:

- 1) Phase 1: will comprise approximately 143 drill holes would be drilled initially within the primary resource target area. Holes would be spaced approximately 50m apart (pending trees and other obstacles) along transects also spaced approximately 50m apart. The proposed transects would be a maximum of 300m in length.
- 2) Phase 2: would build upon results of the first phase of drilling through extending the initial transect lines and/or additional transect lines in areas adjacent to the initial transect lines to expand resources. Holes along the transect lines constructed during this phase would be spaced either 50m or 100m apart, with the additional transect lines spaced up to 200m apart.
- 3) Phase 3: would build upon the second phase of drilling and provides for further infilling, extension of transect lines and inclusion of additional transects. Holes along the transect lines would similarly be spaced either 50m or 100m apart and transect lines would be spaced 50m apart. Pending JORC Code resource estimate requirements there may also be some 25m spaced (mostly DC) holes drilled.

Figure 1.3 proposed exploration location



The length of additional transect lines and total number of holes during the first and second phase of drilling would be subject to the results of the previous phases of drilling. The exact location of transects and drill holes would also vary in order to avoid environmental constraints (such as large trees, archaeological sites). Six additional sterilisation holes will also be drilled within the potential processing area during one of three phases.

In addition to the use of RC and DC drilling techniques, ancillary sampling of waste material from historic mining operations may also be undertaken utilising hand sampling techniques. This sampling would be undertaken in pre-existing disturbance areas and accessed using existing access tracks.

Wherever possible, access to the drilling areas would be obtained via existing unsealed tracks. Additional vehicular access would be along the transect lines and the transect lines would be established in areas that may be classified as follows:

- Open areas requiring no mechanical clearing: in some areas manual cutting of some branches and moving of fallen timber by hand may be required. Small shrubs would be driven over if required, preserving the root stock to facilitate later regrowth. Access can be achieved without mechanical clearing.
- Open areas requiring mechanical movement of fallen timber: due to previous disturbances and fires, some areas contain substantially sized fallen timber. Access within these areas would be achieved via a combination of manual cutting of the timber using a chainsaw and pushing using a suitable bulldozer equipped with a stick rake or blade with a width of approximately 2.5m wide (2.0m to 2.5m). Fallen timber would be pushed to the side with the blade positioned above the ground surface to minimise soil disturbance where present.
- Regrowth areas requiring mechanical clearing: some areas contain thick regrowth material which would require mechanical clearing using a suitably equipped bulldozer as above. The blade would be positioned just above the ground surface and the regrowth material would be pushed to provide a single blade width for access. Regrowth material collected on the bulldozer blade would be pushed to one side at the drill site for later use in rehabilitation.

The proponent confirms that every effort will be made with this development to avoid impacting on any Aboriginal objects. Any development or impacts occurring within the project area will have regard to and managed in accordance with the requirements and provisions of the National Parks and Wildlife Act 1974.

1.4 OBJECTIVES OF THE DUE DILIGENCE ASSESSMENT

The objectives and primary tasks of this due diligence assessment were to:

- Undertake a search of the OEH Aboriginal Heritage Management System (AHIMS) and other relative registers;
- Undertake preliminary research into the environmental and archaeological contexts of the project area;
- Develop a predictive model of site location for the project area;
- Undertake a field survey of the project area;
- Assess the potential impacts of the proposed development on any identified Aboriginal sites or potential archaeological deposits (PADs) identified within the project area;

- Assess the significance of any identified Aboriginal objects or sites identified within the project area;
- Complete and submit site cards to the AHIMS register for any Aboriginal sites identified; and
- Provide appropriate recommendations.

1.5 LEGISLATIVE CONTEXT

The following overview of the legislative framework, is provided solely for information purposes for the client, and should not be interpreted as legal advice. MCH will not be liable for any actions taken by any person, body or group as a result of this general overview and MCH recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the general summary below.

Land managers are required to consider the affects of their activities or proposed development on the environment under several pieces of legislation. Although there are a number of Acts and regulations protecting Aboriginal heritage, including places, sites and objects, within NSW, the three main ones include:

- National Parks and Wildlife Act (1974, as amended)
- National Parks and Wildlife Regulation (2009)
- Environmental Planning and Assessment Act (1979)

1.5.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED)

The National Parks and Wildlife Act (1974), Amended 2010, is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. The NPW Act protects Aboriginal heritage (places, sites and objects) within NSW and the Protection of Aboriginal heritage is outlined in s86 of the Act, as follows:

- “A person must not harm or desecrate an object that the person knows is an Aboriginal object” s86(1)
- “A person must not harm an Aboriginal object” s86(2)
- “A person must not harm or desecrate an Aboriginal place” s86(4)

Penalties apply for harming an Aboriginal object, site or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to \$550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to \$1.1 million. The penalty for a strict liability offence (s86[2]) is up to \$110,000 for an individual and \$220,000 for a corporation.

Harm under the National Parks and Wildlife Act (1974, as amended) is defined as any act that; destroys defaces or damages the object, moves the object from the land on which it has been situated, causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate that;

- 1) harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed), or
- 2) the proponent exercised due diligence in respect to Aboriginal heritage.

The 'due diligence' defence (s87[2]), states that if a person or company has applied due diligence to determine that no Aboriginal object, site or place was likely to be harmed as a result of the activities proposed for the Project Area, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it later transpires that an Aboriginal object, site or place was harmed. If any Aboriginal objects are identified during the activity, then works should cease in that area and OEH notified (DECCW 2010:13). The due diligence defence does not authorise continuing harm.

The archaeological due diligence assessment and report has been carried out in compliance with the NSW DECCW 2010 Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW.

1.5.2 NATIONAL PARKS AND WILDLIFE REGULATION (2009)

The National Parks and Wildlife Regulation 2009 provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The Regulation (2009) recognises various due diligence codes of practice, including the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW which is pertinent to this report, but it also outlines procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs); amongst other regulatory processes.

1.5.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT)

EP&A Act establishes the statutory framework for planning and environmental assessment in NSW and the implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act contains three parts which impose requirements for planning approval:

- Part 3 of the EP&A Act relates to the preparation and making of Environmental Planning Instruments (EPIs), State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).
- Part 4 of the EP&A Act establishes the framework for assessing development under an environmental planning instrument (EPI). The consent authority for Part 4 development is generally the local council, however the consent authority may be the Minister, the Planning Assessment Commission or a joint regional planning panel depending upon the nature of the development.
- Part 4, Division 4.1 of the EP&A Act establishes the assessment pathway for State significant development (SSD) declared by the State Environmental Planning Policy (State and Regional Development) 2011 (NSW). Once a development is declared as SSD, the Director-General will issue Director-General Requirements (DGRs) outlining what issues must be considered in the EIS.
- Part 5 of the EP&A Act provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority. Development under Part 5 that are likely to significantly affect the environment is required to have an EIS prepared for the proposed activity.

- Part 5.1 of the EP&A Act establishes the assessment pathways for State significant infrastructure (SSI). Development applications made for SSI can only be approved by the Minister. Once a development is declared as SSI, the Director-General will issue DGRs outlining what issues must be addressed in the EIS.

The applicable approval process is determined by reference to the relevant environmental planning instruments and other controls, LEPs and State Environmental Planning Policies (SEPPs). This project falls under Part 5.

1.6 ABORIGINAL COMMUNITY CONSULTATION

A due diligence assessment relates to the physical identification of Aboriginal objects, sites and places. Community consultation is only required once Aboriginal objects, sites or places have been identified and an Aboriginal Heritage Impact Permit (AHIP) is deemed necessary. Section 5.2 of the 2010 Due Diligence Code of Practice for the protection of Aboriginal Objects in NSW specifically states that;

'consultation with the Aboriginal community is not a formal requirement of the due diligence process' (2010:8).

1.7 QUALIFICATIONS OF THE INVESTIGATOR

Penny McCardle: Principal Archaeologist/Forensic Anthropologist has 15 years experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation. Twelve years in skeletal identification, biological profiling and skeletal trauma identification.

- BA (Archaeology and Palaeoanthropology, University of New England 1999
- Hons (Archaeology and Palaeoanthropology): Physical Anthropology), University of New England 2001
- Forensic Anthropology Course, University of New England 2003
- Armed Forces Institute of Pathology Forensic Anthropology Course, Ashburn, VA 2008
- Analysis of Bone trauma and Pseudo-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- Currently undertaking a PhD, University of Newcastle, 2016

1.8 REPORT STRUCTURE

The report includes Section 1 which outlines the project, Section 2 presents the environmental and archaeological context, Section 3 provides the results and discussion, Section 4 the Impact Assessment, Section 5 discusses the mitigation measures and Section 6 provides the management recommendations.

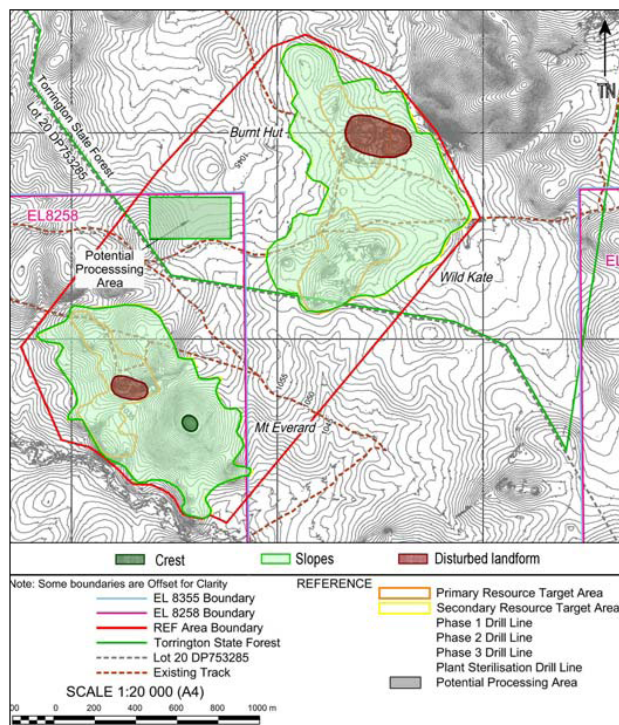
2 ENVIROMNEMATL AND ARCHAEOLOGICAL CONTEXT

The archaeological due diligence process and assessment requires that the available knowledge and information in relation to the environmental and archaeological contexts is considered. The purpose of this is to assist in identifying whether Aboriginal objects, sites or places are likely to be present within the project area based on archaeological predictive modelling and in what condition they may be found in given the environmental impacts.

2.1 LOCAL ENVIRONMENT

Past site location and land use are closely linked to the environment including the landform, geology, geomorphology, soils, waterways and associated resources. The environmental context is important to identify potential factors relating to past Aboriginal land use patterns. The project area is situated to the west of the New England Tableland on the Permo-carboniferous Torrington Pendant geological formation consisting of mudstone, siltstone and quartzite to quartose grelsen (Grafton 1:250,000 Geological Map Sheet 1976). The Torrington Pendant terrain is predominantly flat or gently undulating and drainage is extremely poor and characterised by swamp and grassy forest vegetation types. Highland Home Creek (3rd order) is situated along the far southern boundary of the investigation area and Burnt Hill Creek (2nd Order) is situated along the far northern border with no drainage or water sources in the investigation area. The investigation area is situated in between these two water sources. The northern component of the investigation area encompasses slopes and an abandoned quarry (disturbed landform), the middle component includes very low gentle slopes to flats and the southern component includes a small crest, slopes and an abandoned quarry (Figure 2.1).

Figure 2.1 Landforms of the investigation area



European settlers extensively cleared the original native vegetation in the 1800's and mining in the area dates back to 1882. Mining operations have been undertaken in the Torrington area since the mid-late 19th century (largely for tin), tungsten mining did not commence on a commercial scale until 1903-04. The collapse of the tungsten market post WWI meant all companies had ceased operations by the end of 1919. After this all production was from fossickers and small parties, largely from 1943 to 1953 before the market collapsed again when 81 tons of concentrate were produced from the 14 Block Company tailings. No mining occurred again at Torrington until 1969-72, followed by bulk sampling and a pilot mining program between 1977- 1980 at Burnt Hut, Fielders Hill North, and Wild Kate. Additionally, significant bushfires in 2009 and 2015 have occurred within the project area resulting in significant loss of large old trees that may have been present (scar/carved trees).

Additional disturbances would have derived from natural processes. The patterns of deposition and erosion within a locality can influence the formation and/or destruction of archaeological sites. Within an environment where the rate of erosion is generally high, artefacts deposited in such an environment will be eroded down slope after being abandoned. Additionally, bioturbation processes such as the redistribution and mixing of cultural deposits occurs as a result of burrowing and mounding by earthworms, ants and other species of burrowing animals. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity, and translocation can also occur as a result of tree falls (Balek 2002; Peacock and Fant 2002:92).

The project area is located within an environment that provided fauna and flora and limited raw materials for tool manufacture. However, the most reliable water sources, that are necessary for camping, are to the north and south of the investigation area. The flora and fauna availability and the projects' location in between two water sources, suggests the investigation area would have been utilised for hunting and/or gathering and travel in between the two water sources.

In relation to alterations to the landscape the landscape and any associated cultural materials are likely to have been disturbed and damaged by natural processes as well as land clearing, construction of fire trails, introduced animals, quarrying and bushfires.

2.2 ARCHAEOLOGICAL CONTEXT

A review of the archaeological literature of the Torrington region and the results of a OEH AHIMS search provide essential contextual information for the current assessment.

2.2.1 OEH ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS)

It must be noted that there are many limitation with an AHIMS search including incorrect site coordinates due to errors and changing of computer systems at OEH over the years that failed to correctly translate old coordinate systems to new systems. Secondly, OEH will only provide up to 110 sites per search, thus limiting the search area surrounding the project area and enabling a more comprehensive analysis and finally, few sites have been updated on the OEH AHIMS register to notify if they have been subject to a s87 or s90 and as such what sites remain in the local area and what sites have been destroyed, to assist in determining the cumulative impacts, is unknown. In addition to this, other limitations include the number of studies in the local area, high levels of erosion have proven to disturb sites, site contents, and the extent of those disturbances is unknown. Thus the OEH AHIMS search is limited and provides a basis only that aids in predictive modelling.

A search of the OEH AHIMS register (Appendix A) indicate there are has shown that 17 known Aboriginal sites are currently recorded within a 10 kilometrer radius of the project area (Table 2.1 and Figure 2.1). There are no Aboriginal Places that have been declared within the 10km radius search area and no sites within the project area.

Table 2.1 Summary of AHIMS results

Site Type	Frequency	Percent
AFT	14	82
ART	2	12
AFT/ART	1	6
Subtotal	17	100

Figure 2.2Known sites



2.2.2 HERITAGE REGISTER LISTINGS

The State Heritage Register and Invitory, the national heritage List, The National Trust Register, the Commonwealth Heritage List and the Tenterfield Local Environmental Plan have no Aboriginal objects, sites or places listed within the investigation area.

2.2.3 SUMMARY OF THE ARCHAEOLOGICAL CONTEXT

Only one assessment by English (1998) was undertaken within the 10 kilometres AHIMS search radius of the investigation area. English (1998) was commissioned to undertake an archaeological survey of the Torrington State Recreation Area. These works were undertaken as part of a broader cultural assessment that fed into ongoing management strategies for the State Recreation Area. Past disturbances in the wider area included mining and various agricultural activities.

The study area was comprised of a rugged dissected plateau, with elevated areas, slopes, ridges and drainage lines characterising its extent. Other landscape characteristics included outcrops, granite tors, granite domes, steep valleys and deeply incised drainage lines. Level ground and low hills were predominant through the central portion of the study area. An extremely high floral diversity was identified within the study area, including such vegetation species as New England blackbutt, broad leaved stringybark, Blakely's red gum and red hill gum. The main permanent water sources in the area were Duck Creek, Gulf Creek and Back Creek. Other named water sources included Carpet Snake Creek, Bridge Creek, Flaggie Creek, Blather Creek and Flagstone Creek.

A search of the NPWS register and study of past reports pertaining to studies in the region identified that artefact scatters and rockshelters were the most common site types. Within the study area there were three previously recorded AHIMS sites, being #12-1-0010 (artefact scatter), #12-1-0011 (rockshelter) and #12-1-0012 (artefact scatter). Site #12-1-0012 evidenced contact archaeology, with flaked bottle glass present in the assemblage. One rock art site, a rockshelter and two artefact scatters were also described as having been previously recorded as a part of past assessments within the study area. An aerial survey of the study area was undertaken by helicopter and the purpose of this was to characterise the landforms and hydrology of the study area. The results of the aerial survey were used in conjunction with topographic maps to develop a predictive model which fed into the survey strategy. Archaeological potential was based upon two primary factors, the availability of water and the presence of easy to traverse travel routes. English made the following predictions based on the site search and previous regional investigations;

- There will be a concentrated pattern of open camp sites (artefact scatters) along primary drainage lines and along ridge systems used as travel routes. Larger camps with complex artefact assemblages and evidence of repeated use will tend to occur adjacent to reliable water sources and areas of level or gently sloping terrain. Larger sites will be characterised by relatively high artefact densities and proportions of tools, cores and artefacts. There will also be evidence of stone knapping and other activities such as food preparation and consumption (e.g. the presence of hearths, grinding stones) at these larger sites;
- Open camp sites will also be influenced by floral diversity;
- Smaller camps associated with hunting/gathering will occur along or close to forested edges as they are suited to game hunting being used for diurnal shelter and nocturnal feeding by marsupials. These sites will be characterised by low artefact densities, limited number of tools and a higher proportion of small flakes representing tool maintenance. These small camps may also occur at points along ridge systems used as travel corridors.
- Few sites will be found greater than 100 metres from drainage lines or swamps;
- Shelter sites with occupation will be in clusters along ridge and hill features overlooking a primary drainage line that lies close to or adjacent to a swamp feature;
- Ceremonial sites, if present, will occur on elevated points along ridges or on hill features.

A pedestrian survey was then undertaken and limited to targeting those areas determined as having archaeological potential in the predictive model. It was concluded that the extent of Carpet

Snake Creek and level sections of plateau were the best watered and easiest to traverse areas, leading to them being targeted in the survey. Other plateau and low relief sections of tableland were avoided due to less permanent water sources being present, containing only swamps and widely spaced ephemeral creeks. Similarly areas with steep terrain or deeply incised narrow water channels were avoided, as it was predicted these would have made them less favourable as travel routes for Aboriginal people in the past.

A total of 41 sites were identified and recorded during the survey. These results show that the predictive model was accurate in determining likely areas for sites to be present. It should be noted, however, that the predictive model has not been adequately tested, since those areas predicted as having low potential for archaeological sites were not surveyed as a part of these works. As a result, while sites were determined to be present in the areas of potential, it has not been adequately proven that there is an absence of sites in the other areas that have not yet been subject to survey. Further ground-truthing would be required to assess those landforms that were avoided during this survey, in order to determine the accuracy of the predictive model. This report did not include specific details on all of the 41 recorded sites, with generic descriptions instead used to cover a number of different site types. Those details that were included in the report have been utilised to summarise the survey results below in *Table 2.2* with additional information obtained from topographic maps. It should be noted that there may be errors and omissions in this data due to the limitations of the information provided in the report and limitations in working with topographic maps. Four rockshelters with PAD were also identified and are summarised below in *Table 2.3*.

Table 2.2 Summary of sites (English 1998)

Site	Site type	Landform	Distance to water	Stream order	Artefacts /features	Disturbance	Subsurface potential
Gulf Creek Art Site	rock art	spur /rockshelter	>200m	2 nd	rock art motifs	not provided	no
Back Creek Art Site	rock art	ridgeline midslope	>200m	2 nd	rock art motifs	not provided	no
OS1	artefact scatter	flat or slope	<100m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no
OS2	artefact scatter	flat or slope	<200m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no
OS3	artefact scatter	flat or slope	<200m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no
OS4	artefact scatter	flat or slope	<200m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no
OS5	artefact scatter	flat or slope	<100m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no
OS6	artefact scatter	flat or slope	<100m	2 nd	<40 artefacts	fire trail, sheeting, rilling	no

REVIEW OF ENVIRONMENTAL FACTORS

Report No. 925/01

Appendix 3

TORRINGTON MINERALS PTY LTD

Torrington Tungsten and Topaz Project

OS7	artefact scatter	flat or slope	<100m	2nd	90 artefacts	fire trail, sheeting, rilling	no
OS8	artefact scatter	flat or slope	<200m	3rd order	18 artefacts	fire trail, sheeting, rilling	no
OS9	artefact scatter	flat or slope	<200m	3rd order	<40 artefacts	fire trail, sheeting, rilling	no
OS10	artefact scatter	flat or slope	<100m	3rd order	<40 artefacts	fire trail, sheeting, rilling	no
OS11	artefact scatter	flat or slope	<100m	3rd order	<40 artefacts	fire trail, sheeting, rilling	no
OS12	artefact scatter	flat or slope	<100m	4th order	<40 artefacts	fire trail, sheeting, rilling	no
OS13	artefact scatter	flat or slope	<100m	4th order	<40 artefacts	fire trail, sheeting, rilling	no
OS14	artefact scatter	flat or slope	<100m	5th order	<40 artefacts	fire trail, sheeting, rilling	no
OS15	artefact scatter	flat or slope	<100m	4th order	<40 artefacts	fire trail, sheeting, rilling	no
OS16	artefact scatter	flat or slope	<200m	1st	<40 artefacts	fire trail, sheeting, rilling	no
OS17	artefact scatter	flat or slope	>200m	1st	<40 artefacts	fire trail, sheeting, rilling	no
OS18	artefact scatter	flat or slope	<100m	2nd order	<40 artefacts	fire trail, sheeting, rilling	no
OS19	artefact scatter	flat or slope	<100m	3rd order	<40 artefacts	fire trail, sheeting, rilling	no
OS20	artefact scatter	flat or slope	<100m	2nd order	<40 artefacts	fire trail, sheeting, rilling	no
OS21	artefact scatter	flat or slope	<100m	2nd order	<40 artefacts	fire trail, sheeting, rilling	no
OS22	artefact scatter	flat or slope	<200m	3rd order	<40 artefacts	fire trail, sheeting, rilling	no
OS23	artefact scatter	flat or slope	<200m	1 st order	<40 artefacts	fire trail, sheeting, rilling	no

ST1	scarred tree	not provided	<100m	2nd	A single elongate scar	fire & limb loss	no
IF1	isolated	not provided	<200m	2nd	1 artefact	not provided	no
IF2	isolated	not provided	<200m	3 rd order	1 artefact	not provided	no
IF3	isolated	not provided	<200m	2nd order	1 artefact	not provided	no
IF4	isolated	not provided	<200m	3 rd order	1 artefact	not provided	no
IF5	isolated	not provided	<200m	3 rd order	1 artefact	not provided	no
IF6	isolated	not provided	<200m	3 rd order	1 artefact	not provided	no
IF7	isolated	not provided	<200m	3 rd order	1 artefact	not provided	no
IF8	isolated	not provided	<200m	2nd order	1 artefact	not provided	no
Flagstone 2 Art Site	rock art	slope/rockshelter	<100m	2nd order	Rock art motifs	not provided	no
Flagstone 3 Art Site	rock art	slope/rockshelter	<100m	2nd order	rock art motifs	not provided	no
Westminster 1	rock shelter	not provided	<100m	2nd order	artefacts, rockshelter deposit	not provided	not provided
Westminster 2	rock shelter	not provided	>200m	2nd order	artefacts, ,rockshelter deposit	not provided	not provided
Westminster 3	rock shelter	not provided	>200m	3 rd order	artefacts, rockshelter deposit	not provided	not provided
Westminster 4	rock shelter	not provided	>200m	2nd order	artefacts and rockshelter deposit	not provided	not provided
Blatherarm 1	rock shelter	not provided	>100m	3 rd order	artefacts and rockshelter deposit	not provided	not provided

Table 2.3 Summary of PADs (English 1998)

PAD name	Landform	PAD area	Disturbance	Subsurface potential
Flagstone PAD 1	rockshelter/hillslope	not provided	not provided	yes
Flagstone PAD 2	rockshelter/hillslope	not provided	not provided	yes
Flagstone PAD 3	rockshelter/hillslope	not provided	not provided	yes
Blatherarm PAD	rockshelter/hillslope	not provided	not provided	yes

Using the data from English's study, as shown in Table 2.4, proximity to reliable water was clearly an important factor in site selection along with flat or very gentle slopes in close proximity to a water source. Rockshelters and rock art sites are located in specific environmental locations and as close to reliable water as those conditions allow. For example, suitable surfaces for art and shelters are only available in certain locations. Thus, there are a number of occupation patterns evident including hunting/gathering away from reliable water sources (as indicated in low density artefact scatters and isolated finds on any landform), camping in close proximity to reliable water (as evidenced by high density artefact scatters on flat or gentle slopes) and certain landforms used for specific tasks (art and rock shelters).

Table 2.4 Site type in relation to landform and water

Site type	No of sites	Landform	Distance to water	Disturbed (Y/N)	Subsurface potential
Artefact Scatter	14	flat or slope	<100m	Y	N
Artefact Scatter	8	flat or slope	<200m	Y	N
Artefact Scatter	1	flat or slope	>200m	Y	N
Isolated Artefact	8	not provided	<200m	Y	N
Rock Art	2	slope	<100m	Y	N
Rock Art	1	spur	<200m	Y	N
Rock Art	1	ridgeline	<200m	Y	N
Rockshelter	3	not provided	<200m	Y	not provided
Rockshelter	2	not provided	<200m	Y	not provided
Scarred Tree	1	not provided	<100m	Y	N

English stated that the open sites at Torrington provided little evidence for repeated or extended occupation. All sites contained low density artefacts and only Site 7 included more than 50 artefacts and all sites cover small areas. However, also noted is that the survey strategy may have obscured the results due to low ground surface visibility and the survey strategy itself being somewhat limited. English points out that many of these sites have been disturbed and damaged by natural processes as well as land clearing, construction of fire trails, introduced animals, fossicking and mining. These factors continue to threaten the integrity of many areas that contain Aboriginal sites in the area.

English recommended that a number of site specific management recommendations be implemented for the ongoing use and development of the Torrington State Recreation Area. These management recommendations included Aboriginal community involvement in management, procedures for unexpected finds, skeletal remains, fire hazard reduction, pest control, maintenance and ongoing heritage inspections, including site monitoring and interpretation. It was recommended that further survey work should be conducted in the dissected northern section of the Torrington State Recreation Area as well as along Flaggie Creek and Black Creek.

Based on the available information it is possible to identify a number of trends in site location and patterning within the local area. Open campsites are by far the most common site type with

isolated finds also comparatively well represented. A variety of other site types have been identified in far lower concentrations and include, rock shelters with occupation, shelters with art and a scar tree. The high representation of sites containing stone artefacts is to be expected due to the durability of stone in comparison to other raw materials. Raw materials used for tool manufacture include quartz and mudstone which are the most common lithic artefactual material found in the region. The most common stone artefacts include flakes, flake fragments and flaked pieces. Cores, edge ground axes, millstones, grindstones, hammer stones and backed artefacts also occur though in lower frequencies. Proximity to reliable water was essential for past occupation and the highest percent of sites are identified on very gentle slopes and/or flats within 100 metres of a primary water source. Other landforms such as slopes and crest/ridge formations are also common site locations when in close proximity to reliable water, and when at a distance from water, sites are few and very low density and are typically interpreted as being indicative of travel routes and/or hunting/gathering grounds. Environmental elements also affected occupation as the application of art is applied only to certain rock types and rock shelters are also only located in certain formations.

2.3 SYNTHESIS OF ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXTS

The site types identified throughout the area appear to be either low density/small occupation activities or sites that were associated with more secular activities. The broader landform assessment also suggests that larger sites indicative of larger camping groups may be located on elevated land forms in close proximity to reliable water sources and associated resources compared to locations at distance from such necessary resources where large scale habitation is not possible, but may have been utilised as activity areas away from the main camp. Based on information gained from English (1998), it can be expected that:

- The majority of sites are located within 100 metres of a primary water source;
- High artefact densities sites appear to be situated within 50 metres of a primary water source;
- Artefact densities decrease with increased distance from reliable water sources;
- Main site types are artefact scatters, isolated finds, rock shelters with occupation, rock shelters with art and scar trees;
- Quarts and mudstone are by far the most common raw material types represented at sites in the region;
- Flakes, broken flakes and flaked pieces are the most common artefact types recorded;
- The vast majority of artefactual material in the region was observed on exposures with good to excellent ground surface visibility. The likelihood of finding artefacts surrounding these exposures is reduced due to poor visibility

Relating specifically to the investigation area, the location of primary water sources are well outside the investigation area with no water sources in the investigation area itself, substantially limits the potential for Aboriginal sites to be present. Whilst low density artefact scatters and/or isolated finds and carved/scar trees may be present, impacts such as clearing, quarrying, tracks and bush fires would have impacted on such sites.

2.4 PREDICTIVE MODEL FOR THE PROJECT AREA

An archaeological predictive model is established to identify areas of archaeological sensitivity so it can be used as a basis for the planning and management of Aboriginal heritage. It involves reviewing existing literature to identify basic site distribution patterns. These patterns are then modified according to the specific environment of the project area to form a predictive model for site location within the specific project area. A sampling strategy is then used to test the model and the results of the survey used to confirm, refute or modify the model.

Land systems and environmental factors are commonly used factors in predictive modelling based on the assumption that they provide distinctive sets of constraints and opportunities that influenced past Aboriginal land use patterns. As land use patterns may differ between zones (due to different environmental conditions), this may result in the physical manifestation of different spatial distributions and forms of archaeological evidence. The predictive model presented here is based on the following information;

- Landform units;
- Previous archaeological assessment conducted within the region;
- Distribution of known sites and site densities; and
- Traditional Aboriginal land use patterns.

Also taken into consideration are land use impacts (both natural and anthropomorphic) that may have resulted in a disturbed landscape and associated archaeological record. However, these assumptions may only be clarified during survey and the model updated accordingly if needed.

Brief descriptions of the site types that may occur in the project area are presented below.

- **Artefact scatters**

Also described as open campsites and open sites, these deposits have been defined as two or more stone artefacts within 50 metres of each other and may be found in association with camping where other evidence may be present such as shell, hearths, stone lined fire places and/or heat treatment pits. These sites are usually identified as surface scatters of artefacts in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing, grazing) and access ways can also expose surface campsites. Artefact scatters may represent evidence of;

- Large camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Medium/small camp sites, where activities such as minimal tool manufacturing occurred;
- Hunting and/or gathering events;
- Other events spatially separated from a camp site, or
- Transitory movement through the landscape.

High and moderate density artefact scatters are a common site type in the broader region in direct association with reliable water sources and subsistence resources and reduce in density and numbers with distance from such resources. Low density artefact scatters appear to be present within areas at distance from such resources are indicative of travel and/or hunting/gathering past Aboriginal land uses.

As the investigation area is situated within two water sources, the actual investigation area would have been utilised for travel and/or hunting/gathering in between these two water sources. There is potential for very low density artefact scatters to occur within the investigation area. There is also the potential for such sites to be impacted on through past land uses including previous clearing, quarrying, erosion, tracks and bushfires.

- **Isolated finds**

Isolated artefacts are usually identified in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose surface artefacts. Isolated finds may represent evidence of;

- Hunting and/or gathering events; or
- Transitory movement through the landscape.

Isolated finds appear to be present within areas at distance from reliable water and associated subsistence resources and are indicative of travel and/or hunting/gathering past Aboriginal land uses.

As the investigation area is situated within two water sources, the actual investigation area would have been utilised for travel and/or hunting/gathering. There is potential for isolated finds to occur within the investigation area and such sites are likely to have been impacted by past land uses including previous clearing, quarrying, erosion, tracks and bushfires.

- **Scared/carved trees**

Aboriginal culturally modified trees (scarred and carved) are trees that show the scars caused by the removal of bark or wood for the making of, for example, canoes, vessels, boomerangs, shelters, shields, water containers, shelter roofing or burials and medicines. The shape and size of the scar may indicate the purpose for which the bark or wood was removed from the tree. Scars may also be in the form various holes and shapes (such as toe holds), which were used by Aboriginal people foraging for food. Carved trees were used as markers in association with burial, ceremonial sites or to mark country boundaries. Carved trees associated with burial sites are usually in groups of two or more trees. Carved trees associated with ceremonial grounds may have also been used for educational purposes. Scarred and carved trees are becoming rarer in NSW as the trees decay, are burnt or destroyed. Ensuring that Aboriginal culturally modified trees are not harmed will likely include ensuring that effective buffer zones are used, as their significance is often part of the broader landscape.

The likelihood of discovering scarred/carved trees in the project area is assessed as being very low, due mainly to a number of natural fires, but cannot be discounted.

It is possible that isolated finds, low density artefacts scatters and /or carved/scar trees maybe located within the investigation area on any landform.

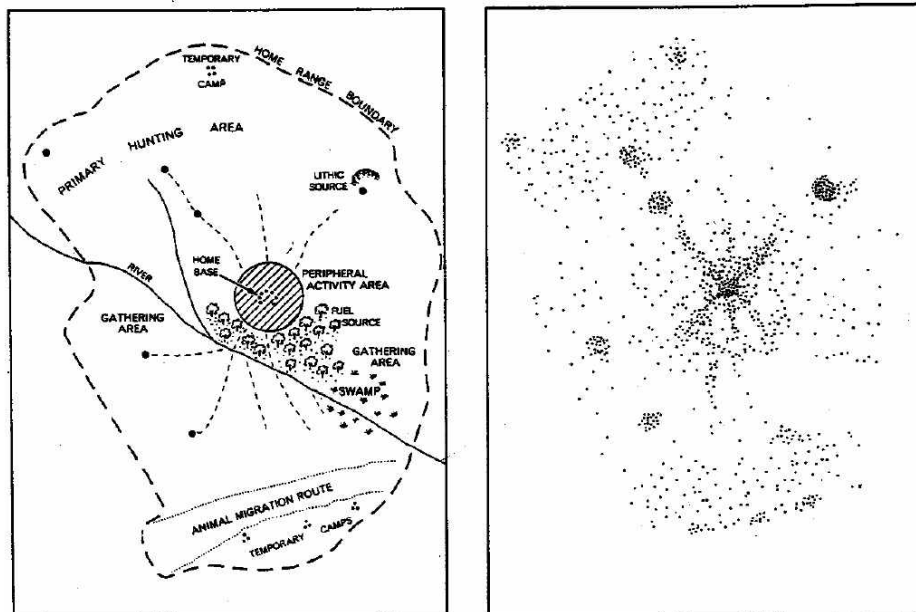
2.5 MODELS OF PAST ABORIGINAL LAND USE

One of the purposes of this assessment is to attempt to define both the nature and extent of occupation across the area. As a result, models of past Aboriginal land use focus on landform units, proximity to reliable water, subsistence resources and sites. The purpose of this strategy is to highlight any variations between sites and associated assemblages, landforms and resources across the area treating assemblages as a continuous scatter of cultural material across the landscape. In doing this, it is possible to identify variation across the landscape, landforms and assemblages that

correspond with variation in the general patterns of landscape use and occupation. Thus the nature of activities and occupation can be identified through the analysis of stone artefact distributions across a landscape.

A general model of forager settlement patterning in the archaeological record was established by Foley (1981). This model distinguishes the residential 'home base' site with peripheral 'activity locations'. Basically, the home base is the focus of attention and many activities and the activity locations are situated away from the home base and are the focus of specific activities (such as tool manufacturing). This pattern is illustrated in *Figure 2.3*. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials etc). The degree of environmental reliability, such as reliable water and subsistence resources, may influence the rate of return to sites and hence the complexity of evidence. Home base sites generally show a greater diversity of artefacts and raw material types (which represent a greater array of activities performed at the site and immediate area). Activity locations occur within the foraging radius of a home base camp (approximately 10 km), (Renfrew and Bahn 1991). Based on the premise that these sites served as a focus of a specific activity, they will show a low diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, it is also possible that the location of certain activities cannot be predicted or identified, adding to the increased dispersal of cultural material across the landscape. If people were opting to carry stone tools during hunting and gathering journeys throughout the area rather than manufacturing tools at task locations, an increased number of used tools should be recovered from low density and dispersed assemblages.

Figure 2.3 Foley's model (L) and its manifestation in the archaeological record (R), (Foley 1981).



Expanding on Foleys model, general theories have been developed outlining the relationship between land use patterns and the resulting archaeological evidence. The model discussed below is a generally accepted model for much of NSW and has been refined using the results of the AHIMS search results and English's study. Kuskie and Kamminga (2000) established a general model of

occupation strategies based primarily upon ethnographic research. Used as a starting point, it makes a general set of predictions. The model distinguishes between short-term and extended long-term occupation and makes some predictions about the likely location of different foraging and settlement activities. The model provides a number of archaeological expectations that may be tested. For example, the presence of features requiring a considerable labour investment such as hearths or heat-treatment pits are likely to occur at places where occupation occurred for extended periods of time. The presence of grindstones is also a reliable indicator of low mobility and extended occupation. Seed grinding requires a large investment of time and effort (Cane 1989). In most ethnographic examples, seed grinding is an activity that takes place over an entire day to provide adequate energetic returns (Cane 1989; Edwards and O'Connell 1995). Where group mobility was high and campsites frequently shifted throughout the landscape, artefact assemblages are not expected to contain grindstones, heat-treatment pits, hearths and the diversity of implements frequently discarded at places of extended residential occupation. It may also have been the case that the location of particular activities could not be predicted by tool users, adding to the increased low-density scattering of artefacts over the landscape. Also, if individuals were opting to carry a number of stone tools during hunting and gathering activities and maintaining these tools rather than manufacturing new tools at each task location, the ratio of used tools to unworn flakes in these assemblages should be high. Table 2.5 has been adapted from Kuskie and Kamminga (2000).

Table 2.5 Site descriptions (Kuskie & Kamminga 2000)

Occupation Pattern	Activity Location	Proximity to water	Proximity to food	Archaeological expectations
Transitory movement	All landscape zones	Not important	Not important	<ul style="list-style-type: none"> • Assemblages of low density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping
Hunting &/or gathering without camping	All landscape zones	Not important	Near food resources	<ul style="list-style-type: none"> • Assemblages of low density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping • High frequency of used tools
Camping by small groups	Associated with permanent & temporary water	Near (within 100m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of moderate density & diversity • Evidence of tool maintenance & repair • Evidence for stone knapping & hearths
Nuclear family base camp	Level or gently undulating ground	Near reliable source (within 50m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of high density & diversity • Evidence of tool maintenance & repair & casual knapping • Evidence for stone knapping • Heat treatment pits, stone lined ovens • grindstones
Community base camp	Level or gently undulating ground	Near reliable source (within 50m)	Near food resources	<ul style="list-style-type: none"> • Assemblages of high density & diversity • Evidence of tool maintenance, repair & casual knapping • Evidence for stone knapping • Heat treatment pits, stone lined ovens • Grindstones & ochre • Large area >100sqm with isolated camp sites

To identify the specific activity areas through analysis of the composition of patterning of lithic assemblages, is utilised. However, this is applied to excavated materials as they provide more realistic data due to the lesser degree of disturbances, removal and breakages.

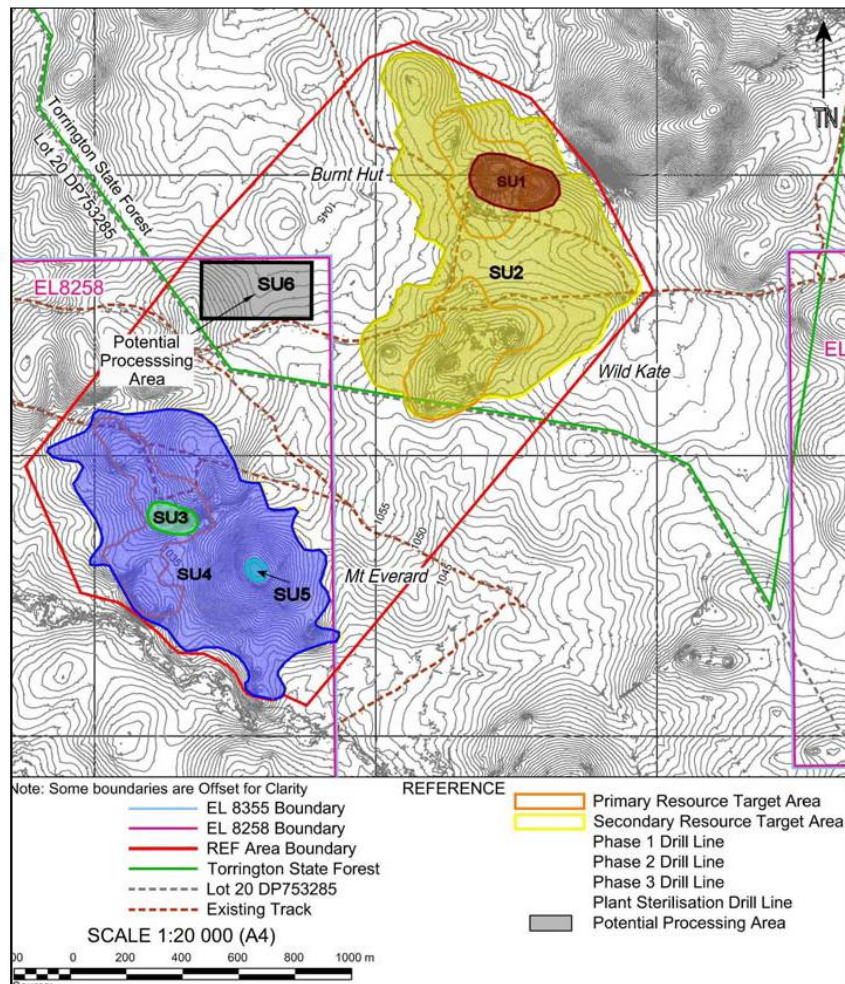
3 RESULTS AND DISCUSSION

To comply with the due diligence requirement that a visual inspection of the project area be undertaken, an archaeological pedestrian survey, undertaken in spiral transects starting from the quarries outwards to the furthest boundaries of both the northern and southern components of the investigation area, and three transects of the centre component was undertaken by MCH archaeologist Penny McCardle on 18/2/2016. The survey focused on areas of high ground surface visibility and exposures (erosional features, tracks, cleared areas) and extremely high visibility throughout the open forest of the entire investigation area.

Landforms included two disturbed areas (previous quarries), one in the northern and southern components of the investigation area, simple slopes in all three components and a small crest in the southern component of the investigation area.

The project included six survey units (SU) that were based on landform elements (following McDonald *et al* 1984). The locations of the SUs are marked on Figure 3.1, discussed below and the survey coverage data is presented in Table 3.1.

Figure 3.1 Survey Units



3.1.1 SU1: QUARRY

SU1 includes the old quarry and large stockpile in the northern portion of the investigation area. Being highly disturbed through the quarrying process and erosion, as well as bushfires, exposures were significant. Vegetation included open forest with numerous saplings and grasses resulting in 50% ground surface visibility but extremely good visibility through the open forest making the identification of any large, old trees present very visible. No archaeological sites or PADs were identified in this SU and there is no potential for archaeological to be present. Examples of SU1 are shown in Figures 3.2 and 3.3.

Figure 3.2 Entrance to quarry (SU1)



Figure 3.3 Quarry stockpile (SU1)



3.1.2 SU2: SLOPES

SU2 included the slopes of the northern portion of the investigation area and disturbances included erosion, animals (pigs, kangaroos) and bushfires. The bushfires resulted in an exposed open bushland allowing excellent visibility of larger, old trees that may have evidence of past use (carved/scar trees). Vegetation included saplings with some young trees and few larger trees. Ground surface visibility was limited by leaf litter and grasses with some open areas present. No archaeological sites or PADs were identified in this SU and there is limited to no potential for archaeological to be present. Examples of SU2 are shown in Figures 3.4 and 3.5

Figure 3.5 SU2 facing west



Figure 3.4 SU2 facing south



3.1.3 SU3: QUARRY

SU3 includes the old quarry in the southern portion of the investigation area. Being highly disturbed through the quarrying process and erosion, as well as bushfires, exposures were significant. Vegetation included open forest with saplings and grasses resulting in 50% ground surface visibility. No archaeological sites or PADs were identified in this SU and there is no potential for archaeological to be present. Examples of SU3 are shown in Figure 3.6.

Figure 3.6 Quarry (SU3)



3.1.4 SU4 SLOPES

SU4 included the slopes of the southern portion of the investigation area and was very similar to the slopes of the northern portion of the investigation area (SU2). Disturbances included erosion, animals (pigs, kangaroos) and bushfires, of which resulted in an exposed open bushland allowing excellent visibility of larger, old trees that may have evidence of past use (carved/scar trees). Ground surface visibility was limited by leaf litter, significant amount of fallen trees and grasses. Some open areas were present and vegetation included saplings with some young trees and few larger trees. No archaeological sites or PADs were identified in this SU and there is limited to no potential for archaeological to be present. Examples of SU2 are shown in Figure 3.7 and 3.8.

Figure 3.7 SU4 facing east



Figure 3.8 SU4 facing north



3.1.5 SU5: CREST

SU5, located in the southern portion of the investigation area, was also an open bushland with low ground surface visibility due to leaf litter and fallen trees. Vegetation included grasses, saplings and young trees. No archaeological sites or PADs were identified in this SU and there is limited to no potential for archaeological to be present. Examples of SU5 are shown in Figure 3.9.

Figure 3.9 SU5 facing south



3.1.6 SU6: SLOPES

SU6 included the very gentle, almost flat area of the middle component of the investigation area. Disturbances included erosion, animals (pigs, kangaroos) and bushfires of which resulted in an exposed open bushland allowing excellent visibility of larger, old trees that may have evidence of past use (carved/scar trees). Ground surface visibility was limited by leaf litter, fallen trees and grasses. Vegetation included a dense amount of saplings with some young trees and few larger trees. No archaeological sites or PADs were identified in this SU and there is limited to no potential for archaeological to be present. Examples of SU6 are shown in Figure 3.10 and 3.11.

Figure 3.10 SU6 facing north



Figure 3.11 SU6 facing north



Table 3.1 Effective coverage for the investigation area

SU	Landform	Area (m2)	Vis. %	Exp. %	Exposure type	Previous disturbances	Present disturbances	Limiting visibility factors	Effective coverage (m2)
1	disturbed	73,500	50%	100%	erosion, tracks, quarry	clearing, quarry, bushfires	erosion	grass, leaf litter	36,750
2	slopes	774,900	5%	15%	erosion, bush fires, tracks	clearing, bush fires, erosion	erosion	grass, leaf litter	5,812
3	disturbed	20,000	50%	100%	erosion, tracks, quarry	clearing, quarry, bushfires	erosion	grass, leaf litter	10,000
4	slopes	639,100	10%	15%	erosion, bush fires, tracks	clearing, bush fires, erosion	erosion	grass, leaf litter	9,587
5	crest	900	10%	15%	erosion, tracks	clearing, bush fires, erosion	erosion	grass, leaf litter	14
6	slopes	80,000	10%	20%	erosion, tracks	clearing, bush fires, erosion	erosion	grass, leaf litter	1,600
Totals		1,588,400							63,762
Effective coverage %									4.01%

The total effective coverage for the project area was 1,588,400 m², or 4.01% reflecting the low surface visibility due to leaf litter, grass and fallen trees. The disturbances included quarries, erosion, tracks, bushfires and animal impacts (pigs and kangaroos), all of which have impacted upon the landscape and associated cultural materials.

The level and nature of the effective survey coverage is considered satisfactory to provide an effective assessment of the Aboriginal sites identified and those potentially present within the investigation area. The coverage was very comprehensive for obtrusive site types (e.g. grinding grooves and scarred trees) but limited for the less obtrusive surface stone artefact sites by surface visibility constraints that included vegetation cover and minimal exposures.

3.2 DISCUSSION

The survey results did not demonstrate the presence of Aboriginal objects within the project area. The results are consistent with those obtained from the previous study (English 1998) in the local area and indicate a very low intensity of past Aboriginal occupation.

Considering general models of occupation for the area, the results of this and Englishes' local investigation, the wider locality (outside the project area) in closer proximity to reliable water and associated resources was utilised by Aboriginal people. However, the specific project area itself is located in between two water sources, with no reliable water sources within the project area itself. As such, the project area is unlikely to have been utilised for more than low intensity usage, for example, transitory movement or hunting/gathering activities. However, if any evidence of such

activities were present, they would have been destroyed through past land uses and impacts such as previous clearing, quarrying, tracks, erosion and bushfires.

3.3 INTERPRETATION & OCCUPATION MODEL

Given the unsuitable landforms in association with significant distance from reliable water sources and associated subsistence resources, and the fact that no sites or PADs were identified, it is not possible to discuss site interpretation or occupation models. However, it is noted that the absence of sites and the distance from resources is suggestive of the area being utilised by past Aboriginal people in the form of travel and hunting/gathering where by a very low intensity of land use results in a very low intensity of archaeological evidence.

3.4 REGIONAL & LOCAL CONTEXT

Discussing the regional and local context is difficult due to the lack of sites identified. Again, however, the results are expected due to the distance from reliable water and associated resources. Evidence of travel and/or hunting/gathering produces very low intensity sites, such as isolated artefacts and/or low density artefact scatters, all of which, if present within the investigation area, would have been impacted on by past land uses and impacts (previous clearing, quarrying, tracks, erosion and bushfires).

3.5 REASSESSMENT OF THE PREDICTIVE MODEL

In view of the survey results, the predictive model of site location can be reassessed for the investigation area. The potential for artefacts to occur within the investigation remains assessed as low or negligible as proximity to reliable water and subsistence resources was necessary for survival, resources that are not present within the investigation area. No sites or PADs were identified within the investigation area and there remains a low to no potential for in situ evidence to occur within the investigation area. Environmental contexts in which sites and potentially deposits of research significance may occur outside the investigation area in association with more focused and/or repeated Aboriginal occupation in close proximity to reliable water and subsistence resources.

3.6 CONCLUSION

Sites provide valuable information about past occupation, use of the environment and its specific resources including diet, raw material transportation, stone tool manufacture, and movement of groups throughout the landscape. Proximity to water was an important factor in past occupation of the local area, with sites reducing in number significantly away from water with most sites located within 100 metres of reliable water sources and on elevated land. The absence of reliable water and subsistence resources as well as suitable surfaces for rock art and rock shelters, rendered the investigation area location unsuitable for sustainable occupation, but may have been utilised for travel and/or hunting/gathering land uses. The impacts from past landuses and natural factors reduce the likelihood of in situ cultural materials to be present.

4 ASSESSMENT OF IMPACTS

The archaeological record is a non-renewable resource that is affected by many processes and activities. As outlined in Section 2 and Section 3, the various natural processes and human activities have impacted on archaeological deposits through both site formation and taphonomic processes.

4.1 IMPACTS

The OEH Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (2010:21) describes impacts to be rated as follows:

- 1) Type of harm: is either direct, indirect or none
- 2) Degree of harm is defined as either total, partial or none
- 3) Consequence of harm is defined as either total loss, partial loss, or no loss of value

No sites or PADs were identified and as such there are no impacts on the archaeological record.

4.2 CUMULATIVE IMPACTS

The cumulative impact to Aboriginal heritage in the area is limited given that:

- The net development footprint (i.e. the area of direct impact) is small and does not affect a high proportion of any particular landform present within the region;
- The high density deposits identified to date occur outside the investigation area;
- The investigation area has been subject to long term past land uses (impacts) that have resulted in a disturbed landscape and as a consequence of these disturbances the representative value of the archaeological resource is lessened. Such impacts include clearing, quarrying, tracks, erosion and bushfires; and
- The placement of the development within this area, in particular in between reliable water sources, and within the disturbed context, ensures the cumulative impacts are focused in the areas of lower potential and therefore are kept to a minimum.

Mitigation measures to minimise these impacts are outlined in the following chapter.

5 MITIGATION AND MANAGEMENT STRATEGIES

Specific strategies, as outlined through the DECCW (2010b) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010c), are considered below for the management of the identified site within the project area.

5.1 CONSERVATION/PROTECTION

Conservation is the first avenue and is suitable for all sites, especially those considered high archaeological significance and/or cultural significance. Conservation includes the processes of looking after an indigenous site or place so as to retain its significance and are managed in a way that is consistent with the nature of peoples' attachment to them.

Due to the level of impacts from past and present land uses, location of the investigation area within an area likely to have been utilised as travel and/or hunting/gathering, and as no sites or PADs were identified within the project area, conservation is not warranted.

5.2 FURTHER INVESTIGATION

An Aboriginal Heritage Impact Permit (AHIP) is no longer required to undertake test excavations (providing the excavations are in accordance with the Code of Practice for Archaeological Investigations in NSW). Subsurface testing is appropriate when a PAD has been identified, and it can be demonstrated that sub-surface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity.

Due to the level of impacts from past and present land uses, location of the investigation area within an area likely to have been utilised as travel and/or hunting/gathering, and as no sites or PADs were identified within the project area, further investigation is not justified.

5.3 AHIP

If harm will occur to an Aboriginal object or Place, then an AHIP is required from the OEH. If a systematic excavation of the known site could provide benefits and information for the Aboriginal community and/or archaeological study of past Aboriginal occupation, a salvage program may be an appropriate strategy to enable the salvage of cultural objects. The AHIP may also include surface collection of artefacts.

As no sites were identified and AHIP is not required.

6 RECOMMENDATIONS

6.1 GENERAL

- 3) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974;
- 4) If an Aboriginal site is identified during any works, works must cease in that location immediately and the Environmental Line notified (131 555).

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APPENDIX A

AHIMS Search Results



AHIMS Web Services (AWS) Search Result

Purchase Order/Reference : Torrington

Client Service ID : 210811

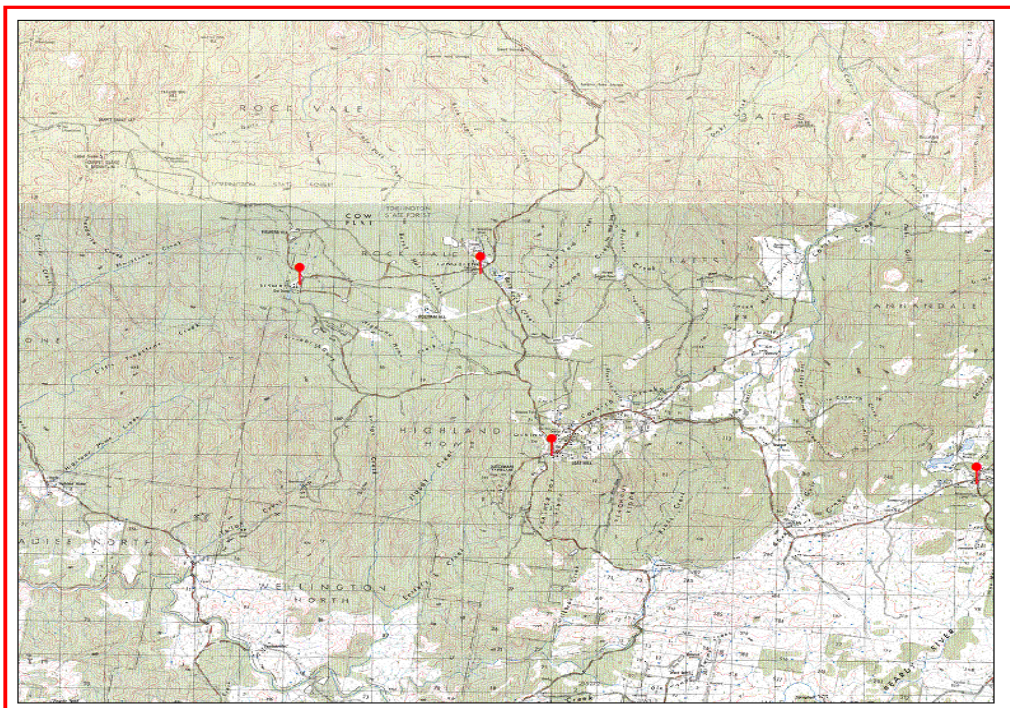
Penny Mccardle
Po Box 166
Adamstown New South Wales 2289
Attention: Penny Mccardle
Email: mcheritage@iprimus.com.au

Date: 09 February 2016

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone :56, Eastings : 362000 - 382000, Northings : 6749000 - 6769000 with a Buffer of 50 meters. Additional Info : assessment, conducted by Penny Mccardle on 09 February 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

17	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette](http://www.nsw.gov.au/gazette) (<http://www.nsw.gov.au/gazette>) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

AHIMS Web Services (AWS)
Extensive search - Site list report




Your Ref/PO Number : Torrington
Client Service ID : 210811

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
12-1-0035	Westminster Shelter	AGD	56	367400	6758000	Closed site	Valid	Artefact : -	Shelter with Deposit	
12-1-0058	Contact BLATHERKAM 2	Recorders AGD	Ray Hfe,S Daley	6763750	Closed site	Valid	Artefact : -	Permits		97520
12-1-0065	Contact Torrington Town art site	Recorders GDA	Ms Louise Gay	6753850	Open site	Valid	Artefact : 5 Art (Pigment or Engraved) : -	Permits		
12-1-0038	Contact Westminster 4	Recorders AGD	Miss Karen Glover	6757938	Closed site	Valid	Artefact : -	Permits	Shelter with Deposit	
12-1-0039	Contact Westminster 3	Recorders AGD	NFWS - Blackheath Office	6757801	Closed site	Valid	Artefact : -	Permits	Shelter with Deposit	
12-1-0040	Contact Westminster 2	Recorders AGD	NFWS - Blackheath Office	6758000	Closed site	Valid	Artefact : -	Permits	Shelter with Deposit	
12-1-0041	Contact OS17	Recorders AGD	NFWS - Blackheath Office	6756500	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0042	Contact OS16	Recorders AGD	NFWS - Blackheath Office	6757723	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0043	Contact OS 18	Recorders AGD	NFWS - Blackheath Office	6755876	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0051	Contact OS21	Recorders AGD	NFWS - Blackheath Office	6760200	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0052	Contact OS23	Recorders AGD	NFWS - Blackheath Office	6757700	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0054	Contact Flagstone 2	Recorders AGD	NFWS - Blackheath Office	6761978	Closed site	Valid	Art (Pigment or Engraved) : -	Permits	Shelter with Art	
12-1-0001	Contact Flagstone Creek Fielders Hill	Recorders AGD	Anthony English, Ms Louise Gay	6761600	Closed site	Valid	Art (Pigment or Engraved) : -	Permits	Shelter with Art	
12-1-0010	Contact Highland Home 1	Recorders AGD	RJ Rowlands	6758200	Open site	Valid	Artefact : -	Permits	Open Camp Site	
12-1-0011	Contact Highland Home 2	Recorders AGD	Klim Gollan	6757500	Closed site	Valid	Artefact : -	Permits	Shelter with Deposit	

Report generated by AHIMS Web Service on 09/02/2016 for Penny McCardle for the following area at Datum GDA, Zone : 56, Eastings : 362000 - 382000, Northings : 6749000 - 6769000 with a Buffer of 50 meters. Additional Info : assessment. Number of Aboriginal sites and Aboriginal objects found is 17

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Office of
Environment
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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Torrington

Client Service ID : 210811

SiteID	SiteName Contact	Datum Records	Zone	Easting	Northing	Context	Site Status	SiteFeatures Permits	SiteTypes	Reports
12-1-0012	Bismuth Mine 1 Bismuth Contact	AGD	56	367300	6761450	Open site	Valid	Artefact: -	Open Camp Site	
12-1-0063	Corner Carpet Snake And Duck Ck 1 Contact	AGD	56	362321	6765940	Open site	Valid	Artefact: 15		
	Sarah Colley	Records	Mr.Rod McIntosh					Permits		

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