CLEAN TEQ

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CLEAN TEQ SUNRISE PROJECT

ACCOMMODATION CAMP MODIFICATION

ENVIRONMENTAL ASSESSMENT

APPENDIX A

Biodiversity Development Assessment Report

CLEAN TEQ SUNRISE PROJECT ACCOMMODATION CAMP MODIFICATION

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

PREPARED BY
RESOURCE STRATEGIES

DECEMBER 2017
Project No. CTL-17-04
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EXECUTIVE SUMMARY

The Clean TeQ Sunrise Project (herein referred to as the Project) is an approved nickel cobalt scandium mining project, approximately 350 kilometres west-northwest of Sydney, near the village of Fifield, New South Wales (NSW). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium 21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ).

A modification to the Project is sought under section 75W of the NSW *Environmental Planning and Assessment Act, 1979* for an alternative location for the approved accommodation camp. The accommodation camp is approved to be located on the western side of the mine site in the vicinity of Wilmatha Road. Clean TeQ has identified an alternative location for the accommodation camp approximately 4 km to the south of the mine site on the Sunrise Property.

The Sunrise Property is owned by Clean TeQ and leased for agricultural activities, such as livestock grazing and dryland cropping. Most of the property has been previously cleared and/or cultivated over many years and the remnant woodland is confined to low hills and along ephemeral drainage features. Scattered trees are present, but often used for livestock shelter. Despite clearing and cultivation, the ground cover that has regrown comprises predominately native grasses, herbs and low shrubs. Without the modified accommodation camp, most of the previously cleared land would most likely be cultivated in the next growing season.

This Biodiversity Development Assessment Report has been prepared in accordance with the *Biodiversity Assessment Method Order, 2017* (BAM) established under the NSW *Biodiversity Conservation Act, 2016* (BC Act). The BC Act commenced in August 2017.

The biodiversity value of the land proposed to be developed was assessed by field surveys and desktop assessment. The field surveys were undertaken by AMBS Ecology and Heritage in October and November 2017 with a site inspection by Resource Strategies in December 2017. Various database and literature sources were reviewed to characterise the landscape features, native vegetation and potentially occurring threatened species under the BC Act and Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

The impact avoidance, minimisation and offset hierarchy has been applied to the Modification. The modified accommodation camp has been specifically located and designed to avoid and minimise impacts on biodiversity values, including native vegetation and potentially occurring threatened species. The modified accommodation camp is proposed to be constructed solely within the previously cleared/cultivated land with minimal biodiversity values. The Modification would result in the clearance of approximately 27.5 hectares of previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs (Plant Community Type 217). Scattered trees would need to be cleared for the Modification, however trees which could provide habitat for threatened 'species credit species' (as defined by the BAM) were surveyed and such trees would be avoided.

No threatened ecological communities listed under the BC Act or EPBC Act would be cleared for the Modification. Only one threatened species, the Grey-crowned Babbler (eastern subspecies) listed as 'Vulnerable' under the BC Act has been recorded in the Development Site Footprint. This species is an ecosystem credit species (as defined by the BAM).

The BAM requires the use of an online program (the BAM Credit Calculator) to assess biodiversity impacts and determine the biodiversity offset requirements for those impacts. According to the BAM Credit Calculator, no ecosystem credits are required for the Modification because the Vegetation Integrity Score (a score generating by the BAM Credit Calculator as a measure of the site condition) is less than 17 (16.6). In accordance with the BAM, no species credits are required for the Modification because no species credit species are present, or are likely to use the land associated with the Development Site Footprint.

The likely direct, indirect and cumulative impacts on biodiversity have been assessed within this report and impact avoidance and mitigation measures have been identified and described. Clean TeQ will prepare a *Biodiversity Management Plan* (BMP) for the Project in accordance with Development Consent DA 374-11-00 and it would include the Modification. The BMP would provide vegetation clearance protocol for the Modification as well as measures to prevent and control weeds and pest animals. Agricultural activities would continue to occur on the Sunrise Property outside the modified accommodation camp area.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

The Clean TeQ Sunrise Project (herein referred to as the Project) is an approved nickel cobalt scandium mining project. The Project is situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW) (Figure 1). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium 21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ). The Project includes the establishment and operation of the following (Figure 1):

- mine (including the processing facility);
- limestone quarry;
- rail siding;
- gas pipeline;
- borefields and water pipeline; and
- associated transport activities and transport infrastructure (e.g. the Fifield Bypass, road and intersection upgrades).

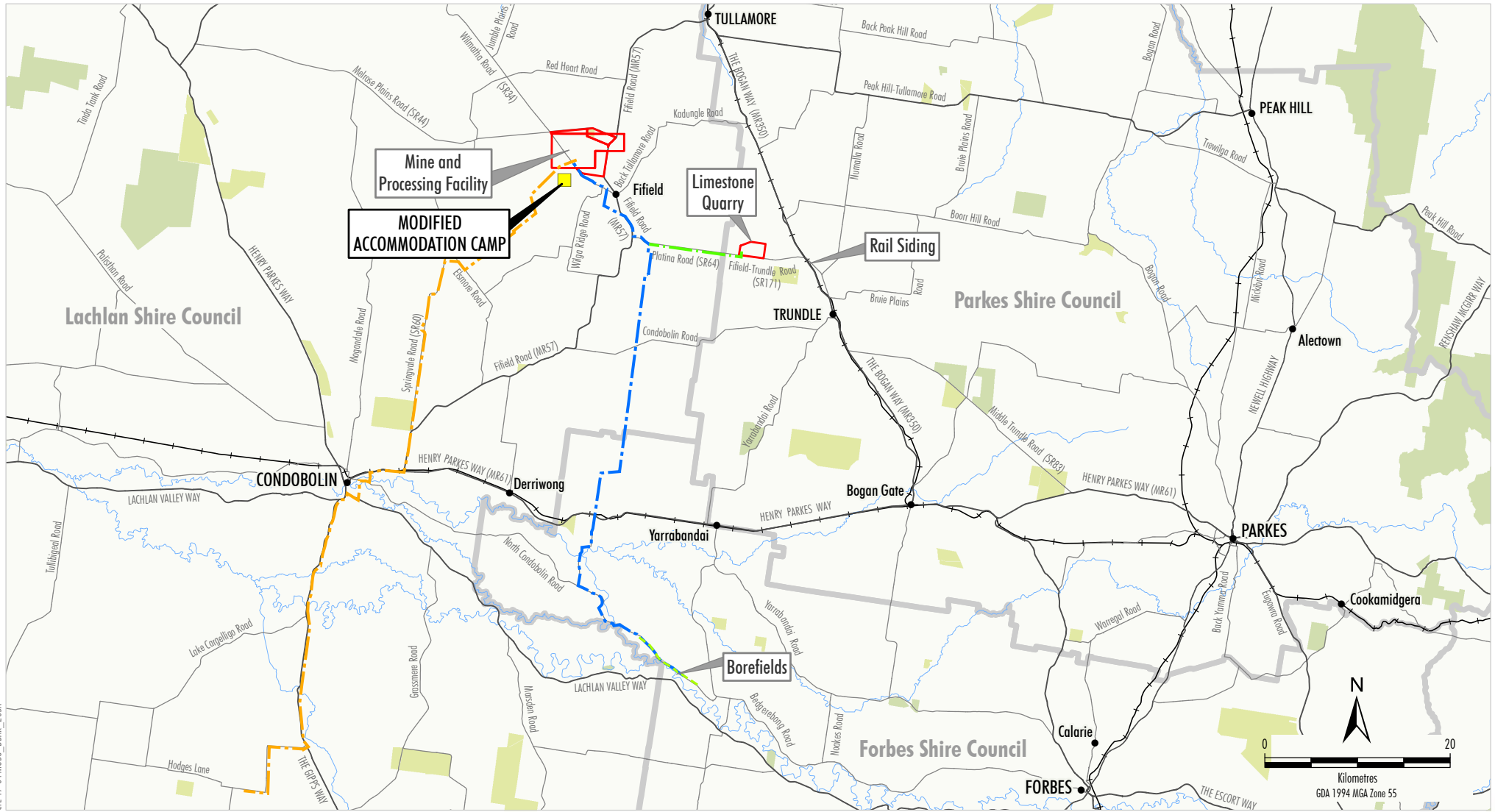
Development Consent DA 374-11-00 for the Project was issued under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) in 2001. A modification to the Project (the Modification) is sought under section 75W of the EP&A Act for an alternative location for the approved accommodation camp. For the purposes of this Biodiversity Development Assessment Report (BDAR), the Modification is assessed as a State Significant Development.

Construction of the Project commenced in 2006 with the construction of components of the borefields, however Project operations are yet to commence.

The accommodation camp is approved to be located on the western side of the mine site in the vicinity of Wilmatha Road. Clean TeQ has identified an alternative location for the approved accommodation camp that would provide improved amenity for the workforce in the accommodation camp and minimise potential operational constraints at the mine site. Clean TeQ also identified the preference to maintain the accommodation camp (at reduced capacity) during operations for the short-term use of contractors and visitors. The Modification would include:

- development of the accommodation camp (including supporting infrastructure) (Figure 2);
- construction of an electricity transmission line (ETL) and water pipeline from the mine site to the modified accommodation camp site (Figure 2);
- minor road upgrades (Figure 2);
- increased accommodation camp capacity (from approximately 1,000 to 1,300 personnel); and
- the accommodation camp (at reduced capacity) would continue to be operated post-construction.

The Modification would not involve changes to any aspects of the approved mine and processing operations, limestone quarry, rail siding or gas pipeline. The approved mine life is 21 years from commencement of mining operations.



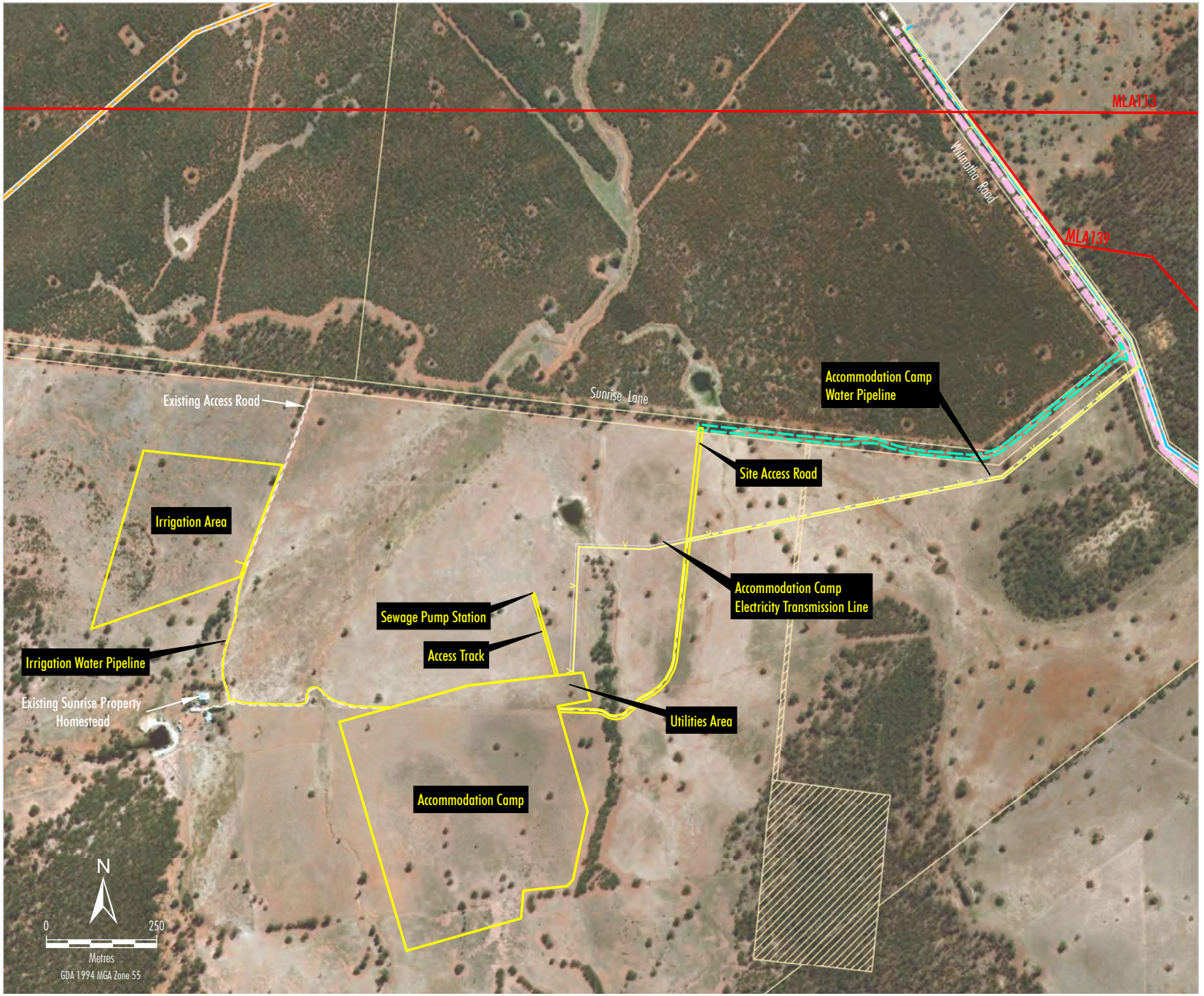
CTL-17-04 MOD6_BDAR_205A

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017); Office of Environment and Heritage NSW (2017)

CLEAN TEQ SUNRISE PROJECT

Project Location

Figure 1



LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Gas Pipeline
- Approved Water Pipeline
- Extent of Approved Road Upgrade
- Property Boundary
- Crown Land
- Modified Layout
- Extent of Modified Road Upgrade

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017)
NSW Imagery: Esri Basemap

CLEAN TEQ SUNRISE PROJECT

Conceptual Modified General Arrangement

Figure 2

CTL-17-04 MOD6_BDAR_206D

1.2 GENERAL DESCRIPTION OF THE DEVELOPMENT SITE FOOTPRINT

The Sunrise Property is owned by Clean TeQ and leased for agricultural activities, such as grazing and dryland cropping. Agricultural activities would continue to occur on the Sunrise Property outside the modified accommodation camp area.

The construction and operational Development Site Footprint is shown on Figure 3. The Development Site Footprint encompasses (Figure 3):

- modified accommodation camp, including:
  - accommodation facilities;
  - administration offices and first aid facility;
  - recreational and mess areas;
  - fire-fighting infrastructure (e.g. fire water tank and reticulation system);
  - internal access roads and car parking areas;
  - communications infrastructure; and
- sewage pump station and related infrastructure;
- utilities area, including:
  - water supply infrastructure (e.g. water treatment plant, storage tanks, distribution system);
  - sewage collection system, treatment plant and storage tanks;
  - power supply infrastructure (e.g. diesel generators, substation);
- accommodation camp ETL (11 kilovolts) (between the mine site and the modified accommodation camp);
- accommodation camp water pipeline (between the mine site and the modified accommodation camp);
- site access road from Sunrise Lane; and
- construction (laydown) areas.

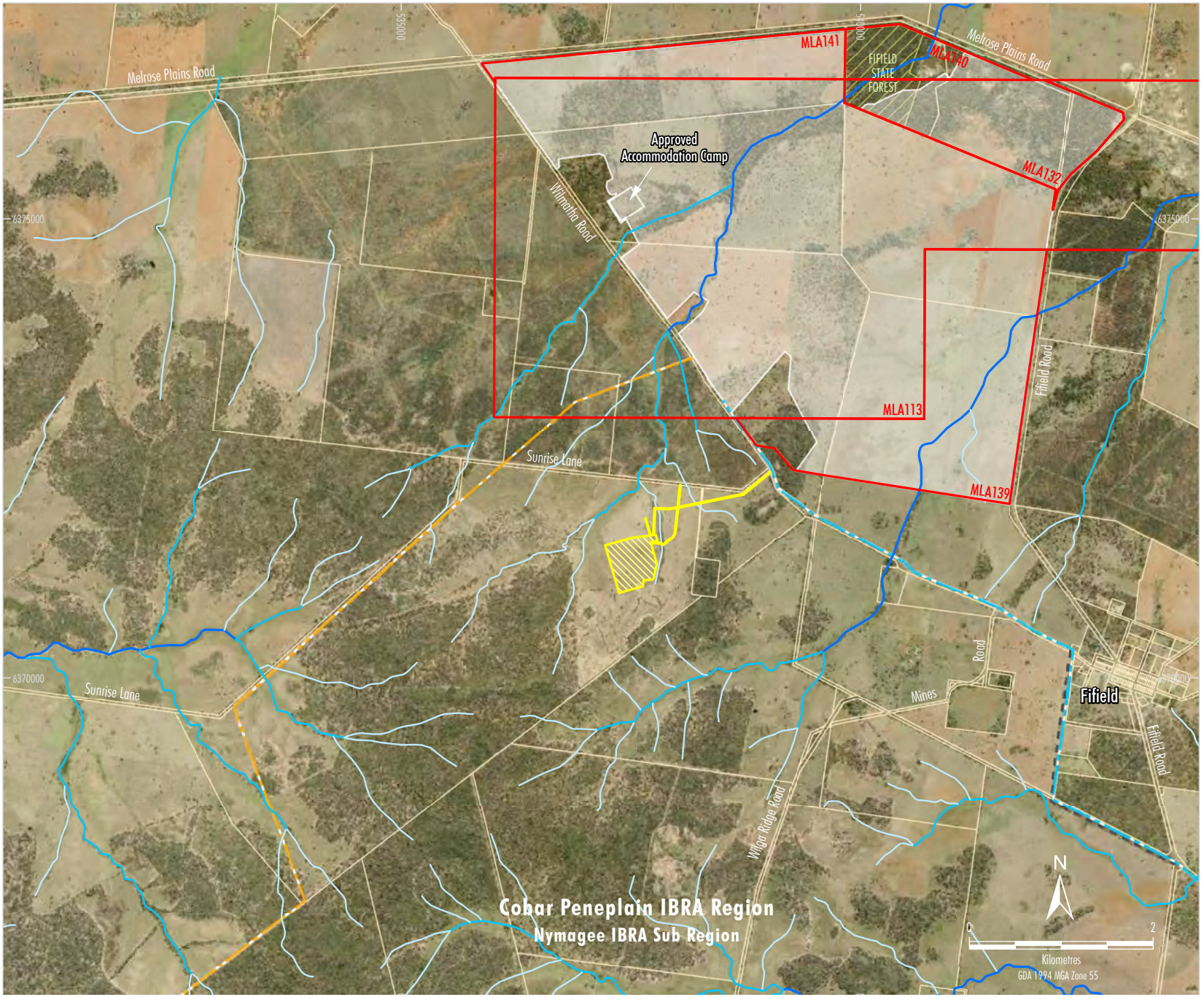
The Modification also includes an irrigation area (approximately 10.5 hectares [ha]) and irrigation water pipeline (Figure 2). Clean TeQ propose no native vegetation clearance for these components as the pipeline would be laid on the ground beside an existing track.

The ETL and water pipeline for the modified accommodation camp enters an approved clearing footprint (9 metres [m] wide) on the northern side of Wilmatha Road. Hence, the clearing footprint for the purpose of this assessment, ends on the southern side of Wilmatha Road. For the purpose of this assessment, the Development Site Footprint corridor associated with ETL and water pipeline is conservatively approximately 9 m wide.

The Development Site Footprint corridor associated with site access road from Sunrise Lane is approximately 9 m wide, and approximately 8 m wide across an ephemeral drainage feature (in an existing cleared track/gap between the Green Mallee Low Woodland).

The minor road upgrades (Figure 2) would be within the extent of the existing road footprint. Clean TeQ propose no native vegetation clearance for the minor road upgrades.

It should also be noted that the Development Site Footprint may vary slightly following further detailed planning. While some changes to the Development Site Footprint could occur, any such changes are expected to be minor and therefore would have no material impact on biodiversity values.



LEGEND

- State Forest
- Mining Lease Application Boundary
- ApprovedSurfaceDevelopmentArea
- Approved Fifield Bypass
- Approved Gas Pipeline
- Approved Water Pipeline
- Development Site Footprint/Subject Land

Strahler Stream Order

- 1st Order
- 2nd Order
- 3rd Order

Source: NSW Department of Industry (2017); NSW Land and Property Information (2017); © Spatial Services - NSW Department of Finance, Services and Innovation (2017); © Crown Lands and Water - a Division of the NSW Department of Industry (2013)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Site Map

Figure 3

CTL-17-04 MOD6_BDAR_201C

1.3 ASSESSMENT REQUIREMENTS/APPROACH

The NSW *Biodiversity Conservation Act, 2016* (BC Act) commenced in August 2017 and establishes a new biodiversity offset scheme for NSW. The Modification has been assessed in accordance with the *Biodiversity Assessment Method Order, 2017* (BAM) (NSW Office of Environment and Heritage [OEH], 2017a) established under Section 6.7 of the BC Act. For the purposes of this BDAR, the Modification is assessed as a State Significant Development.

This BDAR has been prepared by Jamie Gleeson (Resource Strategies), who is an accredited assessor (assessor accreditation number BAAS17080) and peer-reviewed by Dr Colin Driscoll (Hunter Eco), who is also an accredited assessor (assessor accreditation number BAAS17004). The peer review letter is provided in Attachment A.

A third accredited assessor under the BC Act, Mark Semeniuk (AMBS Ecology and Heritage [AMBS]) (BAAS17072), co-authored the *Clean TeQ Sunrise Project Accommodation Camp - Ecological Surveys Report* (Attachment B).

1.4 STRUCTURE OF THIS ASSESSMENT

The structure of the BDAR follows the requirements in Appendix 10 of the BAM (OEH, 2017a).

1.5 INFORMATION SOURCES USED IN THIS ASSESSMENT

This BDAR has been prepared using various data sources as described below.

1.5.1 Field Surveys

In October and November 2017, AMBS (2017a) (Attachment B) collected the ecological survey data in accordance with the BAM (OEH, 2017a). Resource Strategies undertook a site inspection on the 12 December 2017.

1.5.2 Published Databases

Published databases used in this assessment include:

- *BioNet Vegetation Classification* (OEH, 2017b);
- *Threatened Biodiversity Data Collection* (OEH, 2017c)[1];
- *BioNet Atlas* (OEH, 2017d)[2]; and
- *Directory of Important Wetlands of Australia* (Department of the Environment and Energy [DEE], 2017a).

1.5.3 Local Data

It was not necessary use local data or deviate from the OEH databases (OEH, 2017b and c).

[1] This website is titled 'Profiles'.

[2] This website is titled 'Species Sightings Search'

1.5.4 BAM Credit Calculator

BAM Credit Calculator Version 1.2.1.00 (BAM Credit Calculator) (OEH, 2017e) (Last updated: 16/11/2017 16:00) was used in this assessment. On the 6 December 2017, OEH confirmed that there is an error with the BAM Credit Calculator (OEH, 2017e) and that it should not require credits if the Vegetation Integrity Score is below the relevant threshold in the BAM (OEH, 2017a).

2 LANDSCAPE FEATURES

This section provides information on the landscape features in accordance with the BAM (OEH, 2017a). The BAM (OEH, 2017a) refer to 'Subject land' as the land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land (i.e. the landscape features [Section 2], native vegetation [Section 3] and threatened species [Section 4]). For the purpose of this assessment, the 'Subject land' is the same as the 'Development Site Footprint', the area directly impacted on by a proposed development.

2.1 REGIONAL SETTING

The Subject land is located in the Nymagee Interim Biogeographic Regionalisation of Australia (IBRA) Sub-region of the Cobar Peneplain IBRA Region (DEE, 2017b) (Figures 3 and 4). The regional boundaries do not occur near the Subject land and hence are not shown on Figures 3 and 4.

The Subject land is located in Lachlan Shire Council (Figure 4).

2.2 NATIVE VEGETATION COVER

The BAM (OEH, 2017a) defines 'Native Vegetation Cover' as:

> *the percentage of native vegetation cover on the Subject land and the surrounding buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, taking into account vegetation condition and extent. Native over-storey vegetation is used to determine the percent cover in woody vegetation types, and native ground cover is used to assess cover in non-woody vegetation types.*

The extent of native vegetation cover as mapped by site surveys (AMBS, 2017a and b) and regional mapping (OEH, 2016a) is shown on Figure 4.

A buffer area of 1500 m surrounding the outside edge of the boundary of the Subject land (referred to as the 'assessment area surrounding the Subject land' in the BAM [OEH, 2017a]) is shown on Figure 4[3]. There is 44% native vegetation cover within the buffer area.

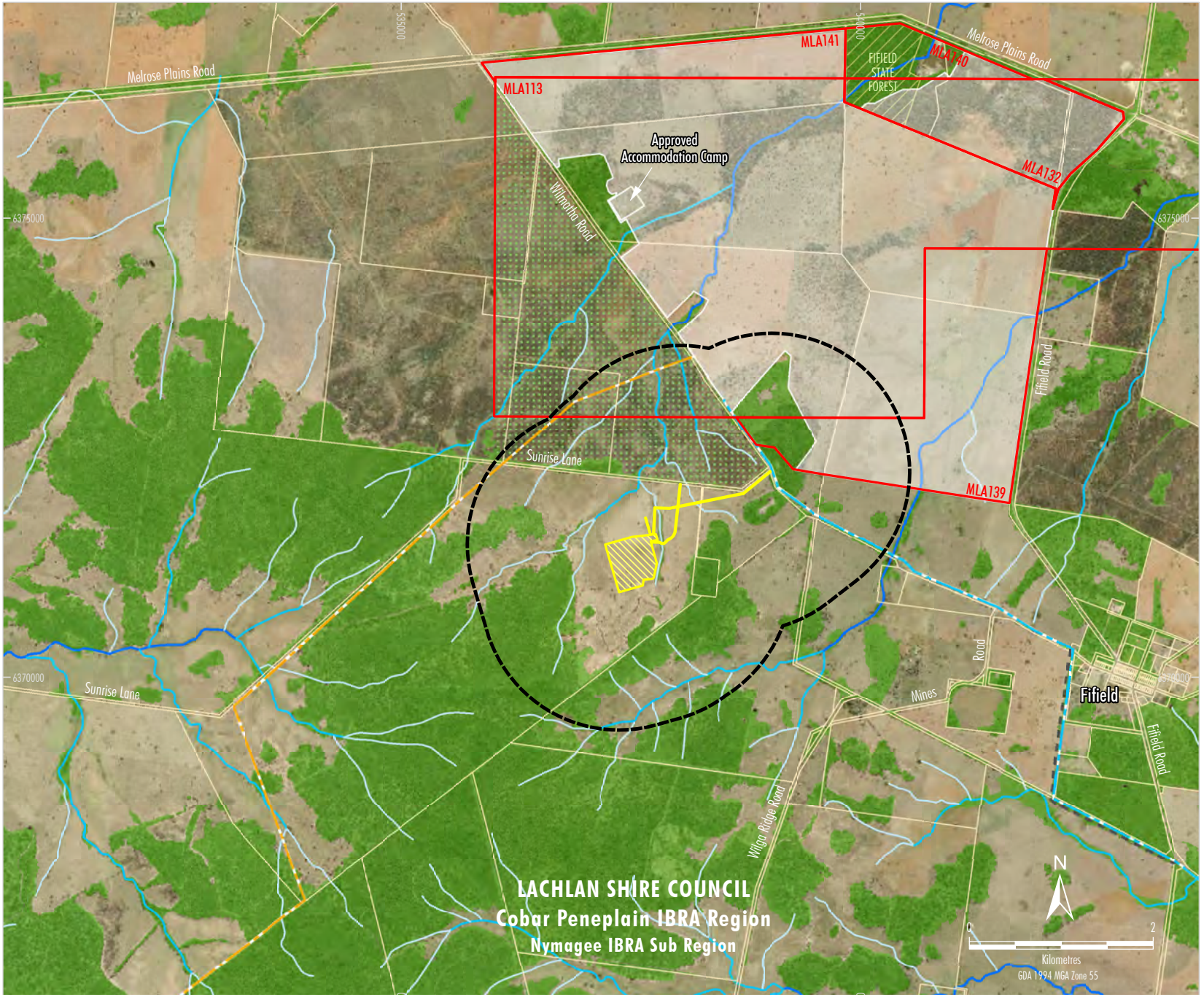
2.3 HABITAT CONNECTIVITY FEATURES

The native vegetation extent/habitat connectivity as mapped by site surveys (AMBS, 2017a and b) and regional mapping (OEH, 2016a) is shown on Figure 4. Any native vegetation on Figure 4 may facilitate the movement of one or more threatened species across their range.

2.4 RIVERS AND STREAMS

Drainage features (and riparian buffer distances based on Strahler stream ordering and the BAM [OEH, 2017a]) is shown on Figures 3 and 4 from the Department of Primary Industries – Water (2017). The site access road follows an existing track which crosses a shallow first order ephemeral drainage feature through an existing track (Figures 3 and 4). The accommodation camp water pipeline and ETL also traverse shallow first order ephemeral drainage features that occur through the cultivated paddock (Figures 3 and 4).

[3] The figure scale has been selected which is appropriate for the size of the 1500 m assessment area.



LEGEND

- State Forest
- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Fifield Bypass
- Approved Gas Pipeline
- Approved Water Pipeline
- Development Site Footprint/Subject Land
- 1500 m Assessment Area
- Native Vegetation Cover/Habitat Connectivity
- Eucalypt Plantation

Strahler Stream Order

- 1st Order
- 2nd Order
- 3rd Order

Source: NSW Department of Industry (2017); NSW Land and Property Information (2017); © Spatial Services - NSW Department of Finance, Services and Innovation (2017); © Crown Lands and Water - a Division of the NSW Department of Industry (2013); OEH (2017); Office of Environment & Heritage NSW (2017); AMBS (2017)
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Location Map

Figure 4

CTL-17-04 MOD6_BDAR_202C

2.5 WETLANDS

There are no important and local wetlands on or, adjacent to the of the Subject land (Figure 4) (after DEE, 2017a; OEH, 2017f). The closest wetland is too far away to be shown on Figure 4.

2.6 GEOLOGY

There are no karst, caves, crevices, cliffs or other areas of geological significance on the Subject land or within the assessment area surrounding the Subject land.

2.7 AREAS OF OUTSTANDING BIODIVERSITY VALUE

There are no Areas of Outstanding Biodiversity Value listed under the NSW *Biodiversity Conservation Regulation, 2017* associated with the Subject land.

2.8 MIGRATORY SPECIES POTENTIAL FLYWAYS

There are no defined potential flyways for migratory species listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) that pass over the Subject land, however, migratory birds could fly over the Subject land similar to most areas in NSW, e.g. Rainbow Bee-eater (*Merops ornatus*).

2.9 SITE CONTEXT COMPONENTS

A site-based method described in the BAM (OEH, 2017a) was applied to the Modification due to the compact size and shape of the Development Site Footprint. The Modification is not eligible for the streamline assessment modules described in the BAM (OEH, 2017a). The supporting infrastructure (pipeline, access road and ETL) are less the 3.5 km in length and therefore do not meet the definition of linear shaped development (OEH, 2017a).

The extent of native vegetation cover is described in Section 2.2. The patch size relative to the vegetation zone is described in Section 3.3.2. There are no additional features required to be assessed by Secretary's Environmental Assessment Requirements (SEARs). No SEARs were issued for the Modification.

3 NATIVE VEGETATION

3.1 PLANT COMMUNITY TYPES

AMBS (2017a) (Attachment B) identified and mapped Plant Community Types (PCTs) on the Subject land and surrounding area in accordance with the BAM (OEH, 2017a) and *BioNet Vegetation Classification* (OEH, 2017b) (Figure 5) (Table 1). AMBS (2017a) justify the PCT and vegetation zone mapping in Attachment B.

The Subject land is located on previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs (Figure 5, Table 1 and Plate 1). Without the modified accommodation camp, most of the previously cleared land would most likely be cultivated in the next growing season. There are small areas of bare ground without native vegetation (cleared land) associated with existing tracks/roads (Figure 5).

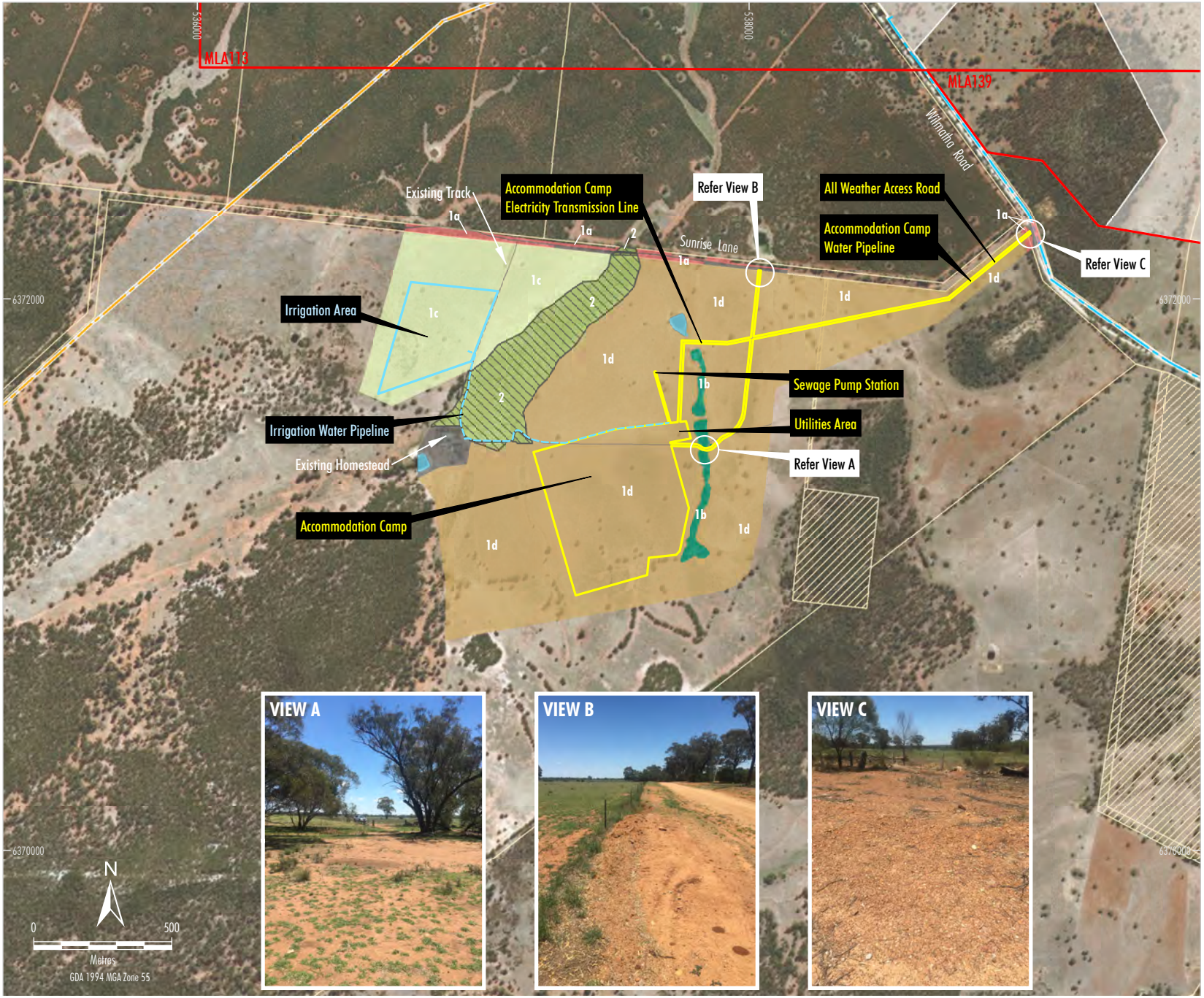
The vegetation integrity (site condition) plot data was independently collected by AMBS (2017a) (Attachment B). The vegetation integrity (site condition) plots used in the BAM Credit Calculator (OEH, 2017e) are shown on Figure 6. The vegetation integrity (site condition) data is provided in Attachment C.

Table 1
Plant Community Types

#*	Map Unit Name	Area of Clearance (ha)	PCT	
1d	Previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs	27.5	217	Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion

* Number based on vegetation communities listed on Figure 5.

Plate 1 – Development Site Footprint - Previously Cleared Land with Regrowth of Predominantly Native Grasses, Herbs and Low Shrubs



LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Gas Pipeline
- Approved Water Pipeline
- Property Boundary
- Crown Land
- Development Site Footprint/Subject Land
- Irrigation Area/Infrastructure

Plant Community

- 1a Green Mallee, Mugga Ironbark Grey Box Woodland (PCT 217)
- 1b Green Mallee Low Woodland (PCT 217)
- 1c Previously cultivated land with advanced grassland/shrubland regeneration (PCT 217)
- 1d Previously cultivated land with regrowth of predominantly native grasses, herbs and low shrubs (PCT 217)
- 2 Low lying area with Derived Native Grassland (PCT 82)
- Cleared land/Non-native areas
- Dam

Threatened Ecological Community

- Derived Grassland form of the Grey Box Woodland EEC (BC Act and EPBC Act)

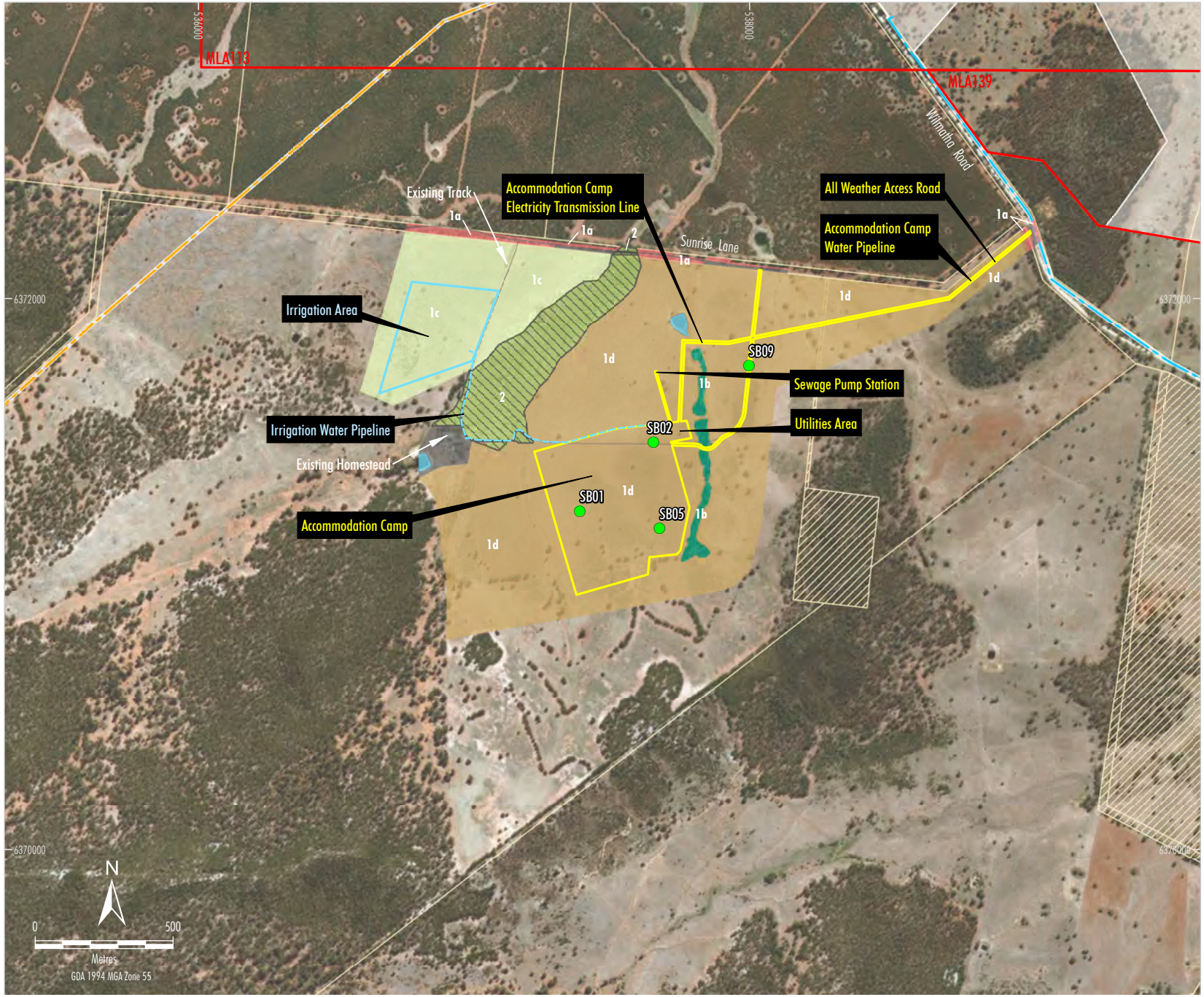
Source: Black Range Minerals (2000); AMBS (2017); NSW Department of Industry (2017); NSW Land & Property Information (2017)
NSW Imagery: Esri Basemap

CLEAN TEQ SUNRISE PROJECT

Plant Community Types

Figure 5

CTL-17-04 MOD6_BDAR_207D



LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Gas Pipeline
- Approved Water Pipeline
- Property Boundary
- Crown Land
- Development Site Footprint/Subject Land
- Irrigation Area/Infrastructure
- Vegetation Integrity Plot

Plant Community

- 1a Green Mallee, Mugga Ironbark Grey Box Woodland (PCT 217)
- 1b Green Mallee Low Woodland (PCT 217)
- 1c Previously cultivated land with advanced grassland/shrubland regeneration (PCT 217)
- 1d Previously cultivated land with regrowth of predominantly native grasses, herbs and low shrubs (PCT 217)
- 2 Low lying area with Derived Native Grassland (PCT 82)
- Cleared land/Non-native areas
- Dam

Threatened Ecological Community

- Derived Grassland form of the Grey Box Woodland EEC (BC Act and EPBC Act)

Source: Black Range Minerals (2000); AMBS (2017); NSW Department of Industry (2017); NSW Land & Property Information (2017)
NSW Imagery: Esri Basemap

CLEAN TEQ SUNRISE PROJECT

Vegetation Integrity Plots

Figure 6

CTL-17-04 MOD6_BDAR_208D

3.1.1 Threatened Ecological Communities

AMBS (2017a) (Attachment B) undertook targeted surveys for potentially occurring threatened ecological communities listed under the BC Act or the EPBC Act. No threatened ecological communities listed under the BC Act or EPBC Act occur within the Subject land/Development Site Footprint.

3.2 PLANT COMMUNITY TYPES PERCENT CLEARED VALUE

The BAM (2017a) defines 'Percent Cleared Value' as the percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the *BioNet Vegetation Classification* (OEH, 2017b). PCT 217 has a Percent Cleared Value of 69% (+/- 80%) (Table 2). As described above, PCT 217 is not a threatened ecological community.

Table 2
Vegetation Zone Data

#	Map Unit Name	PCT		Clearance Area (ha)	Vegetation Zone	Percent Cleared Value[1]	Patch Size	Vegetation Integrity Score
1d	Previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs	217	Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	27.5	1	69% (+/- 80%)	0	16.6

1 *BioNet Vegetation Classification* (OEH, 2017b)

3.3 VEGETATION INTEGRITY ASSESSMENT

3.3.1 Vegetation Zones

There is a single vegetation zone in the Development Site Footprint/Subject land, namely Vegetation Community 1d (Vegetation Zone 1) (Table 2). Vegetation Community 1d is the occurrence of PCT 217 in the lowest condition in the Subject land.

3.3.2 Patch Size

The BAM (OEH, 2017a) defines 'Patch Size' as:

> *An area of **intact native vegetation** that:*
>
> *a) occurs on the development site or biodiversity stewardship site, and*
>
> *b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).*
>
> *Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.*

The BAM (OEH, 2017a) defines '***intact native vegetation***' as:

> *Intact vegetation: vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present.*

Vegetation Community 1d (Vegetation Zone 1) is previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs. Vegetation Community 1d (Vegetation Zone 1) does not meet the definition of intact native vegetation because not all the structural growth form groups expected for a PCT are present (i.e. trees and shrubs are missing due to past and recent clearing for agricultural activities).

The patch size for Vegetation Community 1d (Vegetation Zone 1) is therefore zero (Table 2).

3.3.3 Vegetation Integrity Score

According to the BAM Credit Calculator (OEH, 2017e), the Vegetation Community 1d (Vegetation Zone 1) has a Vegetation Integrity Score of 16.6 (Table 2).

3.3.4 Local Data

It was not necessary use local data to deviate from the OEH databases (OEH, 2017b and 2017c).

4 THREATENED SPECIES

Threatened species that are 'ecosystem credit species' and/or 'species credit species' are pre-determined by OEH in the BAM Credit Calculator (OEH, 2017e) and *Threatened Biodiversity Data Collection* (OEH, 2017c).

The BAM (OEH, 2017a) states:

> *Threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection, are identified in the Threatened Biodiversity Data Collection as ecosystem credit species. Targeted survey is not required for these species.*
>
> …
>
> *'Species credit species' are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits.*

4.1 ECOSYSTEM CREDIT SPECIES - HABITAT SUITABILITY ASSESSMENT

In accordance with the BAM (OEH, 2017a), assessing the habitat suitability for an ecosystem credit species involves the following steps:

Step 1: Identify threatened species for assessment; and

Step 2: Assessment of the habitat constraints and vagrant species on the Subject land.

These steps are applied below.

4.1.1 Step 1: Identify Ecosystem Species for Assessment

A total of 20 ecosystem credit species for assessment are listed in Table 3 from the BAM Credit Calculator (OEH, 2017e). Relevant databases and literature was reviewed for additional ecosystem credit species for assessment and additional ecosystem credit species are listed in Section 4.2.1.

Of the species in Table 3, 12 have been recorded in the wider locality. Only one threatened species, the Grey-crowned Babbler (eastern subspecies) has been recorded in the Development Site Footprint.

Table 3
Ecosystem Species from the BAM Credit Calculator

Scientific Name	Common Name	Conservation Status		Class of Credit	Sensitivity to Gain Class
		BC Act	EPBC Act		
Birds					
Leipoa ocellata	Malleefowl	E	V	Ecosystem	High
Lophoictinia isura	Square-tailed Kite (foraging)	V	-	Species/Ecosystem	Moderate
Hieraaetus morphnoides	Little Eagle (foraging)	V	-	Species/Ecosystem	Moderate
Calyptorhynchus lathami	Glossy Black-Cockatoo (foraging)	V	-	Species/Ecosystem	High
Lophochroa leadbeateri	Major Mitchell's Cockatoo (foraging)	V	-	Species/Ecosystem	Moderate
Neophema pulchella	Turquoise Parrot	V	-	Ecosystem	High
Lathamus discolor	Swift Parrot (foraging)	E	CE	Species/Ecosystem	Moderate
Polytelis swainsonii	Superb Parrot (foraging)	V	V	Species/Ecosystem	Moderate
Tyto novaehollandiae	Masked Owl (foraging)	V	-	Species/Ecosystem	High
Chthonicola sagittata	Speckled Warbler	V	-	Ecosystem	High
Grantiella picta	Painted Honeyeater	V	V	Ecosystem	Moderate
Artamus cyanopterus	Dusky Woodswallow	V	-	Ecosystem	Moderate
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Ecosystem	Moderate
**Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)	V	-	Ecosystem	Moderate
Daphoenositta chrysoptera	Varied Sittella	V	-	Ecosystem	Moderate
Stagonopleura guttata	Diamond Firetail	V	-	Ecosystem	Moderate
Petroica phoenicea	Flame Robin	V	-	Ecosystem	Moderate
Mammals					
Dasyurus maculatus maculatus (south-eastern mainland population)	Spotted-tailed Quoll	V	E	Ecosystem	High
Phascolarctos cinereus	Koala (foraging)	V	V	Species/Ecosystem	High
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Ecosystem	High

[1] Threatened fauna species status under the BC Act and/or EPBC Act (current as at December 2017).
V = Vulnerable; E = Endangered, CE = Critically Endangered

* Species recorded in the Development Site Footprint.
Highlighted species = those recorded in the wider locality

4.1.2 Step 2: Assessment of the Habitat Constraints and Vagrant Species on the Subject Land

The BAM (OEH, 2017a) states*:*

> *the assessor may opt to undertake an additional assessment of the habitat constraints on the Subject land for the threatened species predicted for assessment.*

The ecosystem credit species identified in the BAM Credit Calculator (OEH, 2017e) were not reviewed because the Vegetation Integrity Score is less than 17 (16.6) (Section 3.3.3) and therefore a calculation of ecosystem credits is not required. No further assessment of ecosystem credit species is required.

4.2 SPECIES CREDIT SPECIES - HABITAT SUITABILITY ASSESSMENT

Assessing the habitat suitability for a species credit species involves the following steps:

Step 1: Identify species credit species for assessment.

Step 2: Assessment of the habitat constraints for species credit species on the Subject land.

Step 3: Identify candidate species credit species for further assessment.

Step 4: Determine presence or absence of a candidate species credit species.

Step 5: Determine the area or count, and location of suitable habitat for a species credit species.

Step 6: Determine the habitat condition within the species polygon for species assessed by area.

4.2.1 Step 1: Identify Species Credit Species for Assessment

A total of 14 species credit species are listed in Table 4 for assessment, including 12 species credit species from the BAM Credit Calculator (OEH, 2017e) and two species based on nearby records by AMBS (2017b), namely the *Tylophora linearis* and *Lepidium monoplocoides*.

Table 4
Species Credit Species for Assessment

Scientific Name	Common Name	Conservation Status		Class of Credit
		BC Act	EPBC Act	
Flora				
Austrostipa wakoolica	A spear-grass	E	E	Species
Commersonia procumbens	-	V	V	Species
**Tylophora linearis*	-	V	E	Species
**Lepidium monoplocoides*	Winged Peppercress	E	E	Species
Birds				
Lophoictinia isura	Square-tailed Kite (Breeding)	V	-	Species/Ecosystem
Hieraaetus morphnoides	Little Eagle (Breeding)	V	-	Species/Ecosystem
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	V	-	Species/Ecosystem
Lophochroa leadbeateri	Major Mitchell's Cockatoo (Breeding)	V	-	Species/Ecosystem
Burhinus grallarius	Bush Stone-curlew	E	-	Species
Lathamus discolor	Swift Parrot (Breeding)	E	CE	Species/Ecosystem
Polytelis swainsonii	Superb Parrot (Breeding)	V	V	Species/Ecosystem
Tyto novaehollandiae	Masked Owl (Breeding)	V	-	Species/Ecosystem
Mammals				
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	Species
Phascolarctos cinereus	Koala (Breeding)	V	V	Species/Ecosystem

[1] Threatened fauna species status under the BC Act and/or EPBC Act (current as at December 2017).
V = Vulnerable; E = Endangered, CE = Critically Endangered

* These species are not predicted in the BAM Credit Calculator (OEH, 2017e), however are species for assessment based on nearby records by AMBS (2017b).

The following databases and reports were reviewed for any nearby potentially occurring threatened species records (including species credit species):

- *BioNet Atlas* (OEH, 2017g);
- Birdlife Australia database search (Birdlife Australia, 2017);
- Atlas of Living Australia (2017);
- Future Ecology (2017); and
- AMBS (2017b).

Table 5 provides a summary of the threatened species records in the locality from survey records or database records. Threatened species records are shown on Figures 7, 8a and 8b.

Table 5
Threatened Species Recorded in the Wider Locality

Scientific Name	Common Name	Conservation Status		Class of Credit	Source	Figure
		BC Act	EPBC Act			
Flora						
Austrostipa wakoolica	A spear-grass	E	E	Species	A	Figure 7
Tylophora linearis	-	V	E	Species	A	Figure 7
Lepidium monoplocoides	Winged Peppercress	E	E	Species	A	Figure 7
Birds						
Leipoa ocellata	Malleefowl	E	V	Ecosystem	B	Figure 8a
Falco subniger	Black Falcon	V	-	Ecosystem	B	Figure 8a
Circus assimilis	Spotted Harrier	V	-	Ecosystem	C	Figure 8a
Hieraaetus morphnoides	Little Eagle	V	-	Species/ Ecosystem	B	Figure 8a
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	-	Species /Ecosystem	B, C, D, E	Figure 8a
Neophema pulchella	Turquoise Parrot	V	-	Ecosystem	B	Figure 8a
Polytelis swainsonii	Superb Parrot	V	V	Species/ Ecosystem	B, C, D, E	Figure 8a
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Ecosystem	B, C, D	Figure 8a
Grantiella picta	Painted Honeyeater	V	V	Ecosystem	B	Figure 8a
Artamus cyanopterus	Dusky Woodswallow	V	-	Ecosystem	D	Figure 8a
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Ecosystem	B	Figure 8a
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Ecosystem	B, C, D, E	Figure 8a
Daphoenositta chrysoptera	Varied Sittella	V	-	Ecosystem	B, C	Figure 8a
Pachycephala inornata	Gilbert's Whistler	V	-	Ecosystem	D	Figure 8a
Stagonopleura guttata	Diamond Firetail	V	-	Ecosystem	B, C, D, E	Figure 8a

Table 5 (Continued)
Threatened Species Recorded in the Wider Locality

Scientific Name	Common Name	Conservation Status		Class of Credit	Source	Figure
		BC Act	EPBC Act			
Bats						
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Ecosystem	D	Figure 8b
Miniopterus schreibersii oceanensis	^Eastern Bentwing-bat (breeding)	V	-	Species /Ecosystem	D	Figure 8b
Nyctophilus corbeni	^Corben's Long-eared Bat	V	V	Ecosystem	D	Figure 8b
Chalinolobus dwyeri	^Large-eared Pied Bat	V	V	Species	D	Figure 8b
Chalinolobus picatus	Little Pied Bat	V	-	Ecosystem	D	Figure 8b
Myotis macropus	^Southern Myotis	V	-	Species	D	Figure 8b
Vespadelus troughtoni	^Eastern Cave Bat	V	-	Species	D	Figure 8b

[1] Threatened fauna species status under the BC Act and/or EPBC Act (current as at December 2017).
V = Vulnerable; E = Endangered.

^ unconfirmed calls possibly recorded via bat recording devices.

Blue highlighted species = species credit species not from the BAM Credit Calculator (OEH, 2017e).

A AMBS (2017b).

B Atlas of Living Australia (2017).

C Birdlife Australia (2017).

D Future Ecology (2017).

E OEH (2017g).

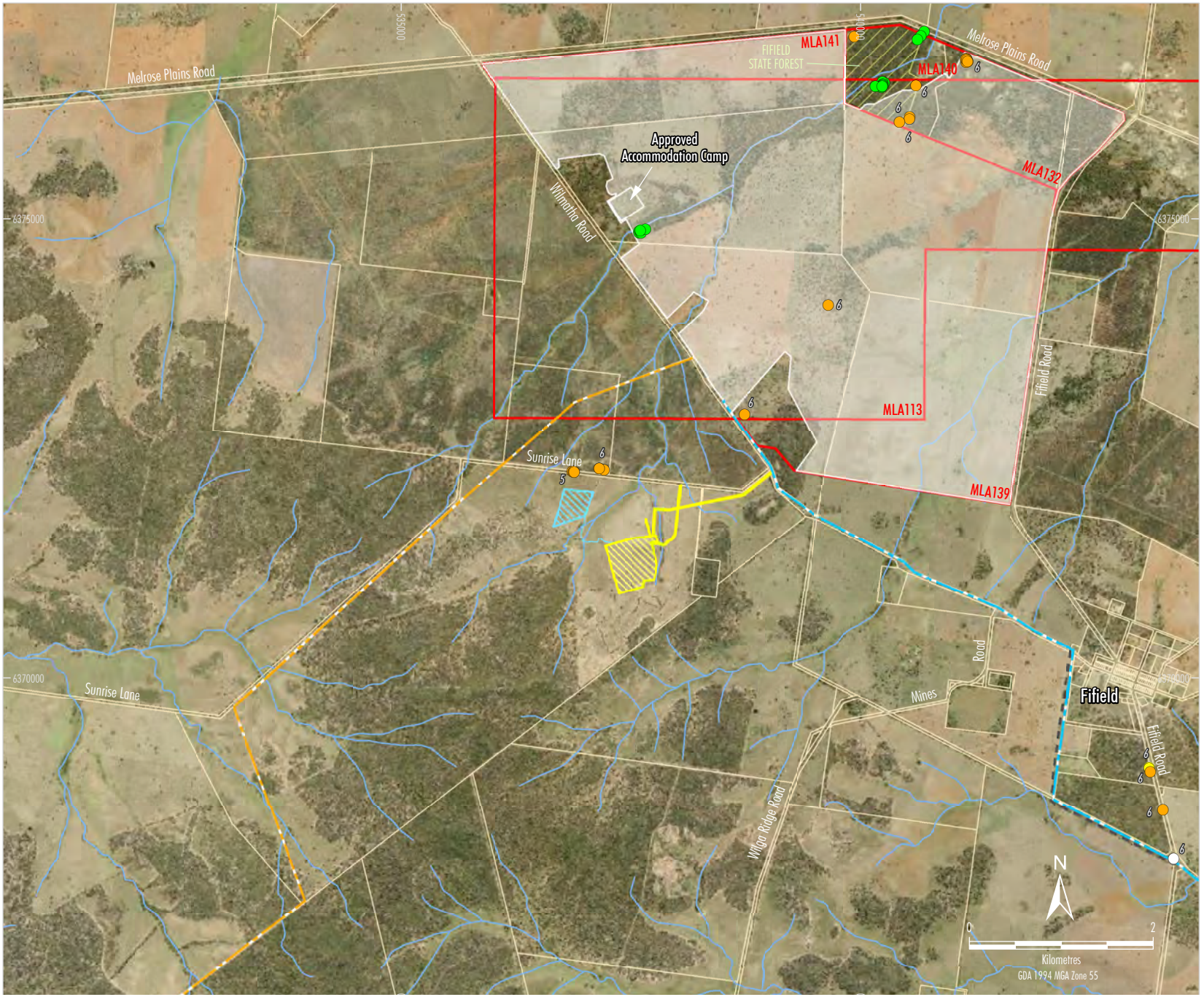
Unconfirmed calls possibly from four cave-dwelling species credit species bats were recorded via bat recording devices by Future Ecology (2017) in the surrounding locality, namely, Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Large-eared Pied Bat (*Chalinolobus dwyeri*), Southern Myotis[4] (*Myotis macropus*) and Eastern Cave Bat (*Vespadelus troughtoni*) (Table 5; Figure 8b). Consistent with the BAM Credit Calculator (OEH, 2017e) (Table 4), these species are not considered to be species credit species for assessment due to the absence of breeding habitat for these species in the Development Site Footprint.

4.2.2 Step 2: Assessment of the Habitat Constraints for Species Credit Species on the Subject Land

Habitat constraints are identified in the *Threatened Biodiversity Data Collection* (OEH, 2017c) for some fauna species credit species and the absence of the habitat constraints precludes the species from further assessment (Table 6). Step 2 is not applicable to a species where no habitat constraints are listed for that species in the *Threatened Biodiversity Data Collection* (OEH, 2017c), e.g. threatened flora.

AMBS (2017a) (Attachment B) undertook a field assessment of habitat constraints for the species in Table 6. A description of the methods is provided below.

[4] The Southern Myotis can use tree hollows however the Modification is not located within the known or likely habitat distributions for this species and the nearest database record is located approximately 150 km north-west of the Development Site Footprint (OEH, 2017d). This species is also dependant on waterways for foraging which are absent from the Subject land.



LEGEND

- State Forest
- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Fifield Bypass
- Approved Gas Pipeline
- Approved Water Pipeline
- Development Site Footprint/Subject Land
- Irrigation Area/Infrastructure

Threatened Species

- *Austrostipa wakoolica*
- *Lepidium monoplocoides*
- *Swainsona sp.*
- *Tylophora linearis*

Reference: 5. AMBS (2017)
6. AMBS (2016)

Note: There are no references 1 - 4 on this figure.

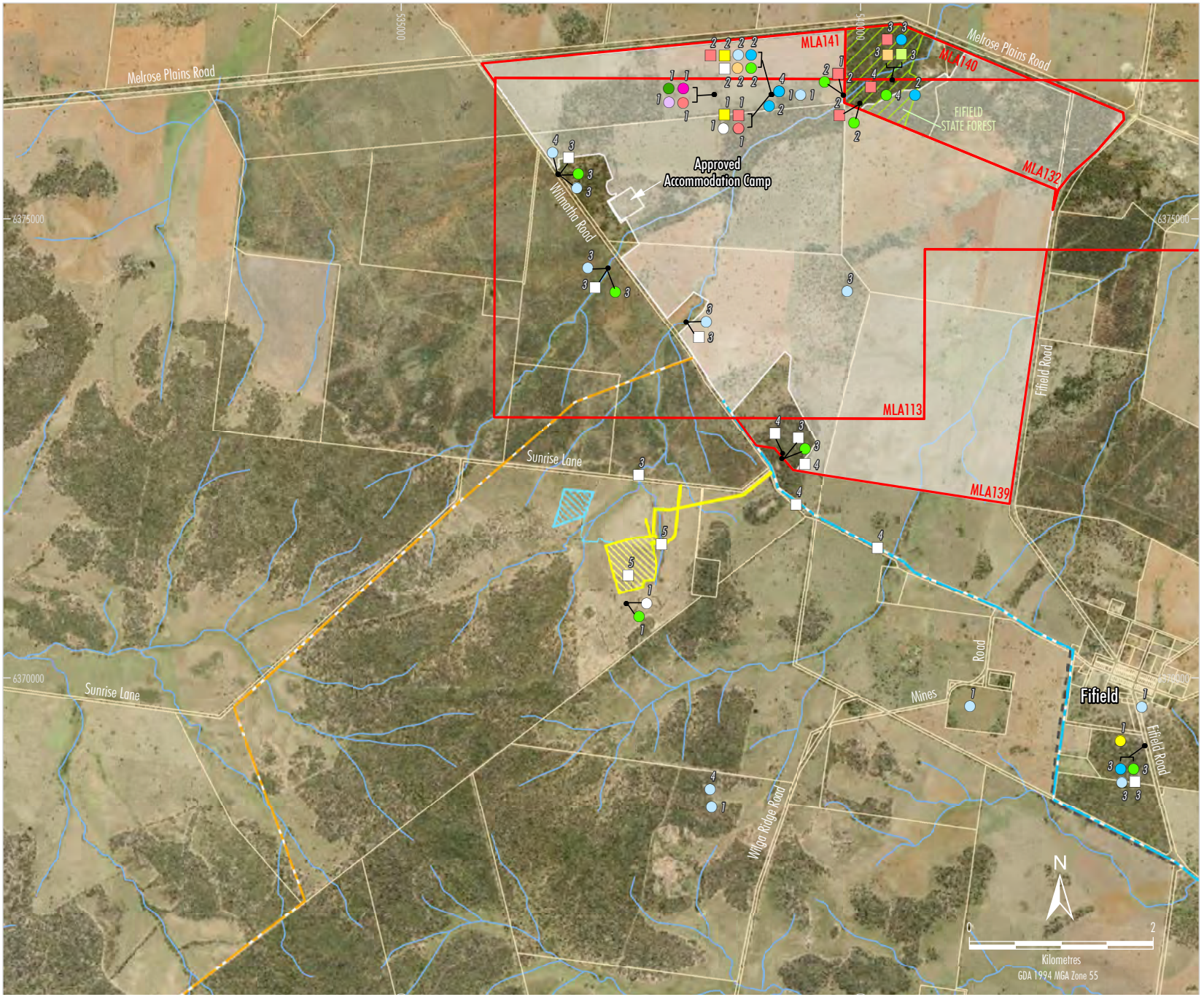
Source: NSW Department of Industry (2017); NSW Land and Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Threatened Flora

Figure 7

CTL-17-04 MOD6_BDAR_209B



LEGEND

- Mining Lease Application Boundary
- State Forest
- Approved Surface Development Area
- Approved Fifield Bypass
- Approved Gas Pipeline
- Approved Water Pipeline
- Development Site Footprint/Subject Land
- Irrigation Area/Infrastructure

Threatened Birds

- Malleefowl
- Black Falcon
- Spotted Harrier
- Little Eagle
- Major Mitchell's Cockatoo
- Turquoise Parrot
- Superb Parrot
- Brown Treecreeper (eastern subspecies)
- Painted Honeyeater
- Hooded Robin
- Grey-crowned Babbler (eastern subspecies)
- Varied Sittella
- Gilbert's Whistler
- Diamond Firetail
- Dusky Woodswallow

Reference: 1. Atlas of Living Australia (2017)
2. Birdlife Australia (2017)
3. Future Ecology (2017)
4. OEH (2017)
5. AMBS (2017)

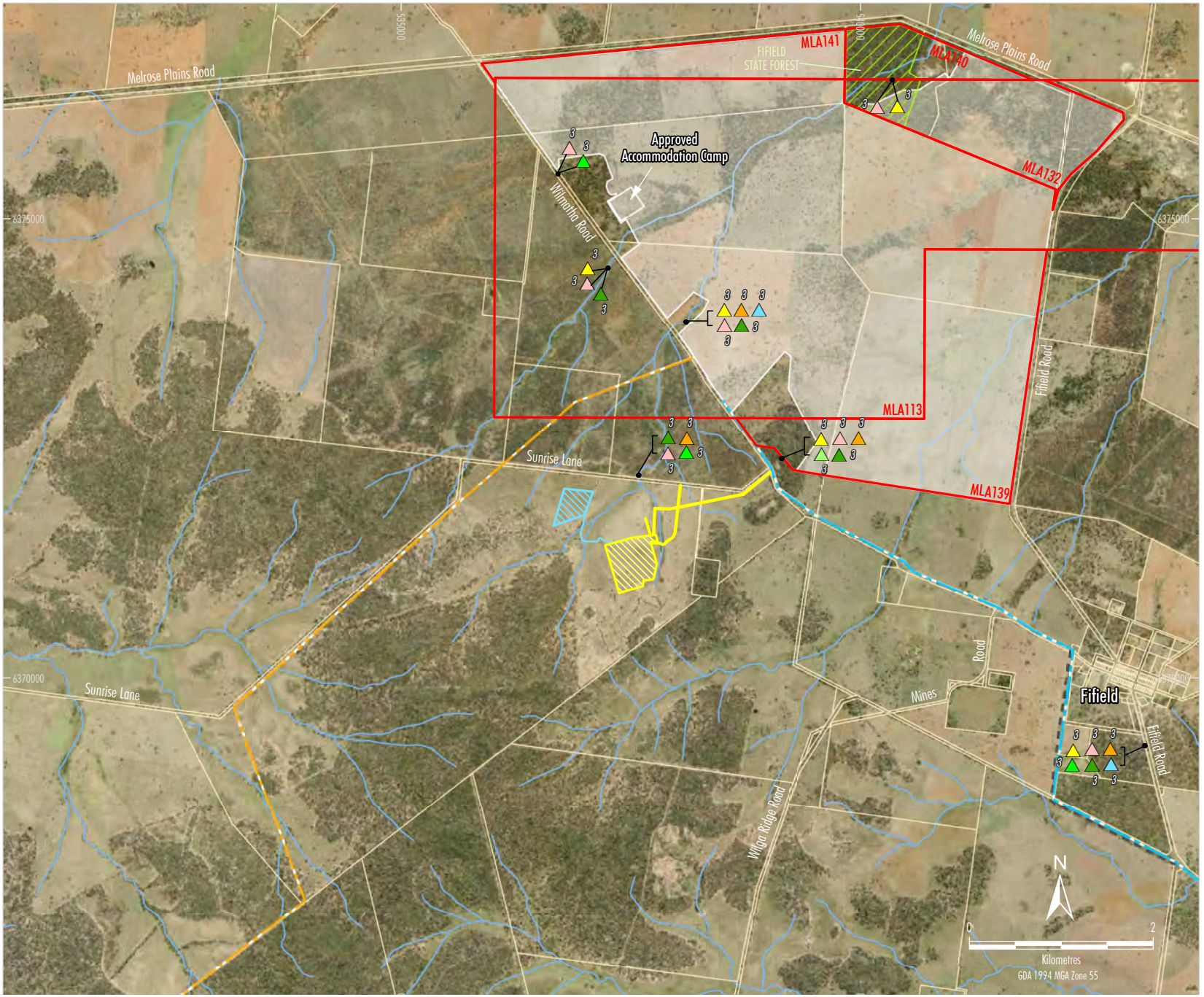
Source: NSW Department of Industry (2017); NSW Land and Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Threatened Fauna - Birds

Figure 8a

CTL-17-04 MOD6_BDAR_203C



LEGEND

- State Forest
- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Fifield Bypass
- Approved Gas Pipeline
- Approved Water Pipeline
- Development Site Footprint/Subject Land
- Irrigation Area/Infrastructure

Threatended Mammals

- Yellow-bellied Sheathtail-bat
- ^ Eastern Bentwing-bat
- ^ Corben's Long-eared Bat
- ^ Large-eared Pied Bat
- Little Pied Bat
- ^ Southern Myotis
- ^ Eastern Cave Bat

Reference: 3. Future Ecology (2017)

Note: There are no references 1 and 2 on this figure.
^ Unconfirmed calls possibly recorded via bat recording devices.

Source: NSW Department of Industry (2017); NSW Land and Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Threatened Fauna - Mammals

Figure 8b

CTL-17-04 MOD6_BDAR_204C

Tree Census

The location of trees with potential habitat for species credit species within a study area surrounding the Development Site Footprint was identified using aerial imagery and site inspections by AMBS (2017a) (Attachment B).

Tree Hollow Assessment

Hollow-bearing trees within a study area surrounding the Development Site Footprint were assessed by AMBS (2017a) (Attachment B) and data were collected on tree hollow sizes, numbers, heights; tree species, height, Diameter at Breast Height (DBH) and whether it was living or a stag. The tree hollow assessment considered the occurrence of:

- living or dead tree with hollows greater than 15 centimetres (cm) diameter and greater than 5 m above ground for the Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- living or dead tree with hollows greater than 10 cm diameter for the Major Mitchell's Cockatoo (*Lophochroa leadbeateri*);
- living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa* and *E. polyanthemos* with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm for the Superb Parrot (*Polytelis swainsonii*);
- living or dead trees with hollows greater than 20 cm diameter for the Masked Owl (*Tyto novaehollandiae*); and
- hollow bearing trees for the Brush-tailed Phascogale (*Phascogale tapoatafa*) (tree hollows with entrances 2.5 - 4 cm wide [OEH, 2017c]).

Search for Suitable Fallen/Standing Dead Timber

Potential habitat with suitable fallen/standing dead timber for the Bush Stone-curlew was searched for in the study area by AMBS (2017a) (Attachment B).

Searches for Stick Nests

A search for stick-nests, as evidence of potential breeding of Square-tailed Kite (*Lophoictinia isura*) and Little Eagle (*Hieraaetus morphnoides*) was undertaken within the Development Site Footprint (and elsewhere on an opportunistic basis).

Habitat Assessment Results

After carrying out a field assessment of habitat constraints, AMBS (2017a) (Attachment B) concluded that the habitat constraints for the following species credit species are not present in the Development Site Footprint (Table 6):

- Square-tailed Kite (breeding habitat);
- Little Eagle (breeding habitat);
- Glossy Black-Cockatoo (breeding habitat);
- Major Mitchell's Cockatoo (breeding habitat);
- Bush Stone-curlew[5];
- Swift Parrot (breeding habitat) (this species was also not predicted to occur in the Protected Matters Search (DEE, 2017c);

[5] There is a single record of the Bush Stone-curlew approximately 40 km south of the Subject land (OEH, 2017d).

Table 6
Species Credit Species – Habitat Feature/Components

Scientific Name	Common Name	Class of Credit (OEH, 2017c)	Requirement for Species Credit (BAM Credit Calculator [OEH, 2017e])	Can Paddock Trees be Important to the Species (OEH, 2017c)	Habitat Constraints identified in the *Threatened Biodiversity Data Collection* (OEH, 2017c)	Field Assessment of Habitat Constraints/Survey Method (AMBS, 2017a)	Results Field Assessment of Habitat Constraints (AMBS, 2017a)	Are the Habitat Constraints Present in the Vegetation Zone/Habitat Not Substantially Degraded Such that the Species is Not Unlikely to Utilise the Subject Land?
Lophoictinia isura	Square-tailed Kite	Species (Breeding)/ Ecosystem	Breeding habitat	*No*	*Nest trees*	Tree census and searches for stick nests	No potential nest trees were found within the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint
Hieraaetus morphnoides	Little Eagle	Species (Breeding)/ Ecosystem	Breeding habitat	*Yes*	*Nest trees - live (occasionally dead) large old trees within vegetation.*	Tree census and searches for stick nests	No potential nest trees were found within the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint
Calyptorhynchus lathami	Glossy Black-Cockatoo	Species (Breeding)	Breeding habitat	*Yes*	*Living or dead tree with hollows greater than 15 cm diameter and greater than 5 m above ground.*	Tree hollow assessment	No living or dead tree with hollows greater than 15 cm diameter and greater than 5 m above ground occur within the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint

Table 6 (Continued)
Species Credit Species – Habitat Feature/Components

Scientific Name	Common Name	Class of Credit (OEH, 2017c)	Requirement for Species Credit (BAM Credit Calculator [OEH, 2017e])	Can Paddock Trees be Important to the Species (OEH, 2017c)	Habitat Constraints identified in the *Threatened Biodiversity Data Collection* (OEH, 2017c)	Field Assessment of Habitat Constraints/Survey Method (AMBS, 2017a)	Results Field Assessment of Habitat Constraints (AMBS, 2017a)	Are the Habitat Constraints Present in the Vegetation Zone/Habitat Not Substantially Degraded Such that the Species is Not Unlikely to Utilise the Subject Land?
Lophochroa leadbeateri	Major Mitchell's Cockatoo	Species (Breeding)/ Ecosystem	Breeding habitat	*Paddock trees with hollows greater than 10 cm diameter*	*Living or dead tree with hollows greater than 10 cm diameter*	Tree hollow assessment	No living or dead tree with hollows greater than 10 cm diameter occur within the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint
Burhinus grallarius	Bush Stone-curlew	Species	-	*Yes*	Fallen/standing dead timber including logs	Search for fallen/standing dead timber which could provide habitat for the Bush Stone-curlew	No fallen/standing dead timber which could provide habitat for the Bush Stone-curlew occurs within the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint
Lathamus discolor	Swift Parrot	Species (Breeding)/ Ecosystem	Breeding habitat	*Yes*	*As per mapped area*	OEH has not yet released mapping. OEH confirmed (14-12-17) that the Development Footprint does not fall within the OEH draft mapped area.	N/A	No, habitat constraints absent from the Development Site Footprint

Table 6 (Continued)
Species Credit Species – Habitat Feature/Components

Scientific Name	Common Name	Class of Credit (OEH, 2017c)	Requirement for Species Credit (BAM Credit Calculator [OEH, 2017e])	Can Paddock Trees be Important to the Species (OEH, 2017c)	Habitat Constraints identified in the *Threatened Biodiversity Data Collection* (OEH, 2017c)	Field Assessment of Habitat Constraints/Survey Method (AMBS, 2017a)	Results Field Assessment of Habitat Constraints (AMBS, 2017a)	Are the Habitat Constraints Present in the Vegetation Zone/Habitat Not Substantially Degraded Such that the Species is Not Unlikely to Utilise the Subject Land?
Polytelis swainsonii	Superb Parrot	Species (Breeding)/ Ecosystem	Breeding habitat	*Only E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa & E. polyanthemos*	*Living or dead E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa & E. polyanthemos with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm.*	Tree hollow assessment	A single *E. microcarpa* occurs in *the* Development Site Footprint and it does not contain tree hollows	No, habitat constraints absent from the Development Site Footprint^
Tyto novaehollandiae	Masked Owl	Species (Breeding)/ Ecosystem	Breeding habitat	*Yes*	*Living or dead trees with hollows greater than 20 cm diameter.*	Tree hollow assessment	No living or dead trees with hollows greater than 20 cm diameter occur in the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint
Phascogale tapoatafa	Brush-tailed Phascogale	Species	-	*Yes*	*Hollow bearing trees*	Tree hollow assessment	No trees with hollows potentially suitable for the Brush-tailed Phascogale occur in the Development Site Footprint	No, habitat constraints absent from the Development Site Footprint

Table 6 (Continued)
Species Credit Species – Habitat Feature/Components

Scientific Name	Common Name	Class of Credit (OEH, 2017c)	Requirement for Species Credit (BAM Credit Calculator [OEH, 2017e])	Can Paddock Trees be Important to the Species (OEH, 2017c)	Habitat Constraints identified in the *Threatened Biodiversity Data Collection* (OEH, 2017c)	Field Assessment of Habitat Constraints/Survey Method (AMBS, 2017a)	Results Field Assessment of Habitat Constraints (AMBS, 2017a)	Are the Habitat Constraints Present in the Vegetation Zone/Habitat Not Substantially Degraded Such that the Species is Not Unlikely to Utilise the Subject Land?
Phascolarctos cinereus	Koala	Species (Breeding)/ Ecosystem	Breeding habitat	*Yes*	*Areas identified via survey as important habitat (see comments) Important' habitat is defined by the density of koalas and quality of habitat determined by on-site survey - contact OEH for more information.*	OEH confirmed (14-12-17) that Koala was to be considered a species credit species for the Modification. Assumed possibly present	N/A	Assumed candidate species (Table 9)

* Although noted to be breeding habitat in the BAM Credit Calculator (OEH, 2017e), this species does not breed in NSW.

^ The habitat constraint is absent, however OEH (2017e) states the following for the Superb Parrot: '*breeding habitat can be identified by the presence of habitat features and observed nest OR two or more birds seen on site'.* AMBS (2017a) (Attachment B) undertook an avifauna census targeting this species. This specie was not found and it is therefore not a candidate species credit species for further assessment.

- Superb Parrot (breeding habitat);
- Masked Owl (breeding habitat); and
- Brush-tailed Phascogale[6].

Any trees with potential habitat for species credit species were avoided (Figure 9) as described in Section 5.1.

In accordance with the BAM (OEH, 2017a), no further assessment is required for the above listed species. The Koala is assumed to be a candidate species for further assessment (Table 6) as the species does not have a specific habitat constraint in the *Threatened Biodiversity Data Collection* (OEH, 2017c) and OEH confirmed (14 December 2017) that Koala was to be considered a species credit species for the Modification. The closest records of Koala are approximately 55 km east of the Modification and approximately 50 km west (OEH, 2017d).

Additional Survey Work

Despite the above bird species not requiring surveys, AMBS (2017a) (Attachment B) undertook avifauna surveys in accordance with Department of Environment and Conservation (DEC) (2004a). Two, 20-minute area searches for diurnal birds were undertaken on two consecutive mornings, targeting Square-tailed Kite, Little Eagle, Glossy Black-Cockatoo, Superb Parrot and Major Mitchell's Cockatoo. None of these birds were recorded.

In addition, AMBS (2017a) (Attachment B) undertook targeted surveys for evidence of Glossy Black-Cockatoo foraging within the Development Site Footprint was undertaken in areas where food species of the genera Allocasuarina and Casuarina occur. If cones were found under the sample species, they were investigated for evidence of chewing. No evidence of Glossy Black-Cockatoo was found.

4.2.3 Step 3: Identify Candidate Species Credit Species for Further Assessment

After considering the habitat constraints (Step 2), candidate species credit species for further assessment are listed in Table 7.

Table 7
Candidate Species Credit Species for Further Assessment

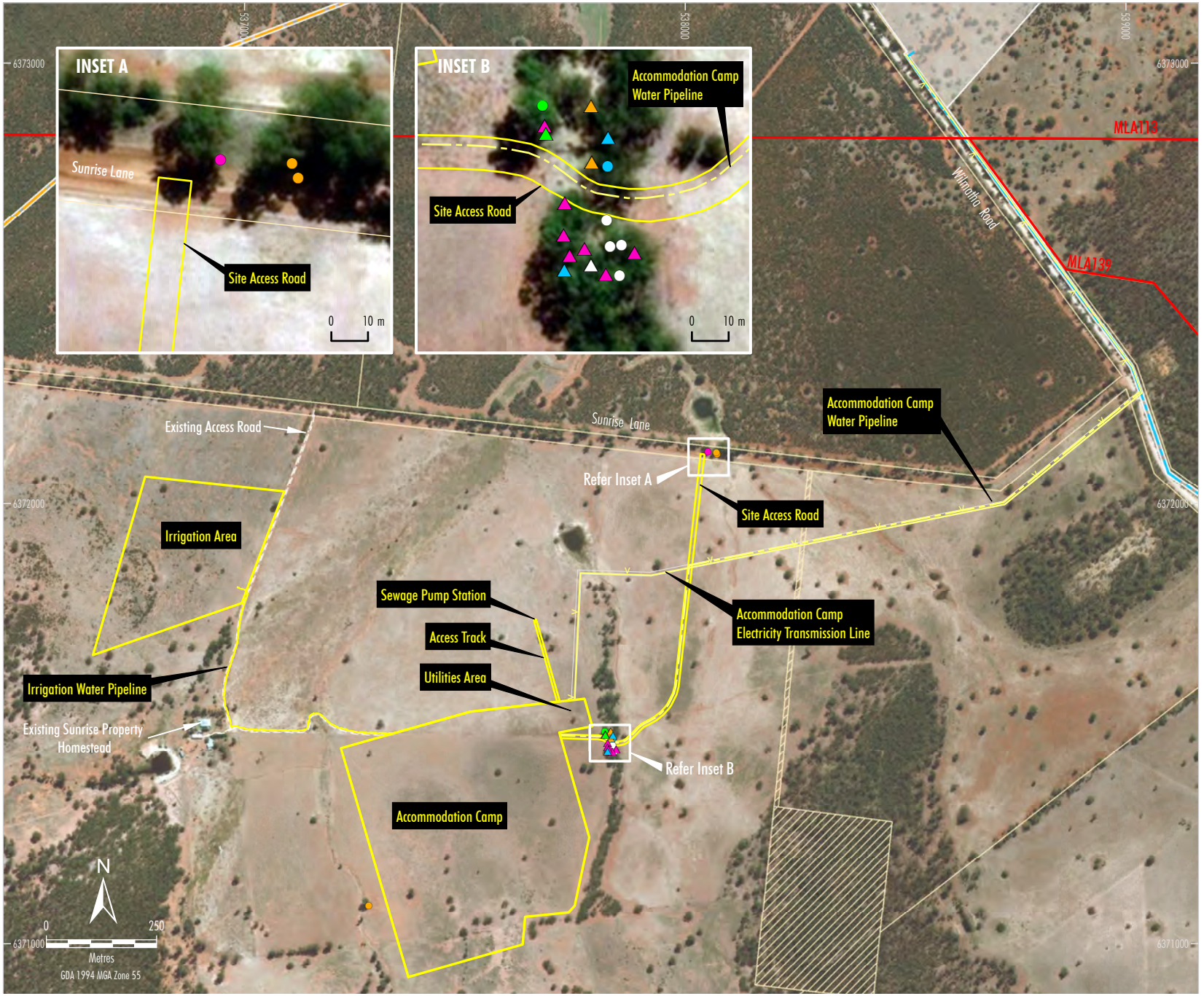
Scientific Name	Common Name	Class of Credit^	Biodiversity Risk Rating^
Austrostipa wakoolica	A spear-grass	Species	High
Commersonia procumbens	-	Species	High
**Tylophora linearis*	-	Species	High
**Lepidium monoplocoides*	Winged Peppercress	Species	High
Phascolarctos cinereus	Koala (Breeding)	Species/Ecosystem	High

* Species not predicted in the BAM Credit Calculator (OEH, 2017e), however added to the Species Credit Species for assessment based on nearby records by AMBS (2017b).

^ BAM Credit Calculator (OEH, 2017e)

No species listed in Table 7 are Serious and Irreversible Impact (SAII) Entities as none have a Biodiversity Risk Rating of 'very high'.

[6] In NSW, the Brush-tailed Phascogale is mainly found east of the Great Dividing Range although there are occasional records west of the Great Dividing Range (OEH, 2017c). There is a single record of the Brush-tailed Phascogale approximately 40 km south of the Subject land (OEH, 2017d). This record is a historical record from 1919 made by the South Australian Museum from population that is no longer extant (OEH, 2017d). There are no other records in the IBRA region (OEH, 2017d).



LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Approved Gas Pipeline
- Approved Water Pipeline
- Property Boundary
- Crown Land
- Modified Layout

Potential Species Habitat Tree

- Tree potentially suitable for Brush-tailed Phascogale, Square-tailed Kite
- Tree potentially suitable for Glossy Black-Cockatoo, Major Mitchell's Cockatoo, Superb Parrot
- Tree potentially suitable for Glossy Black-Cockatoo, Major Mitchell's Cockatoo, Superb Parrot, Little Eagle
- Tree potentially suitable for Glossy Black-Cockatoo, Major Mitchell's Cockatoo, Superb Parrot, Little Eagle, Square-tailed Kite
- Tree potentially suitable for Glossy Black-Cockatoo, Major Mitchell's Cockatoo, Superb Parrot, Square-tailed Kite
- Tree potentially suitable for Major Mitchell's Cockatoo, Square-tailed Kite
- Tree potentially suitable for Major Mitchell's Cockatoo, Superb Parrot, Barking Owl, Masked Owl, Square-tailed Kite
- Tree potentially suitable for Square-tailed Kite
- Tree potentially suitable for Superb Parrot, Little Eagle, Square-tailed Kite
- Tree potentially suitable for Superb Parrot, Square-tailed Kite

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017); AMBS (2017)
NSW Imagery: Esri Basemap

CLEAN TEQ SUNRISE PROJECT

Potential Habitat Trees for Species Credit Species

Figure 9

CTL-17-04 MOD6_BDAR_210B

4.2.4 Step 4: Determine Presence or Absence of a Candidate Species Credit Species

AMBS (2017a) (Attachment B) undertook targeted surveys for candidate species credit species (Table 7) to determine presence or absence of the species within the survey period required by the BAM Credit Calculator (OEH, 2017e) (Table 8). The timing, methods and effort area outlined below and detailed in Attachment B.

Threatened Flora

Targeted searches for threatened flora species were undertaken by AMBS (2017a) (Attachment B) in accordance with the NSW *Guide to Surveying Threatened Plants* (OEH, 2016b) in areas of potential habitat. Surveys for threatened flora species were undertaken in October over a period of two days and in November over a period of three days (AMBS, 2017a) (Attachment B).

No threatened flora species were recorded by AMBS (2017a) (Attachment B) in the Development Site Footprint. *Tylophora linearis* was found at four locations within the Sunrise Lane road easement, to the north of the Development Site Footprint (Figure 7). The population was found in Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation 1a) under Grey Box (*Eucalyptus microcarpa*) trees.

Koala (Breeding Habitat)

AMBS (2017a) (Attachment B) undertook surveys for the Koala involving both direct observation and indirect observation methods consistent with the *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment, 2014). Direct observation involved diurnal searches for individuals of the species in trees within and nearby the Development Site Footprint. Every tree within the Development Site Footprint was checked. Indirect survey techniques involved searches for scratches on tree trunks and also searches for scats.

Table 8
Candidate Species Credit Species - Survey Timing

Scientific Name	Common Name	Class of Credit	January	February	March	April	May	June	July	August	September	October	November	December
Flora														
Austrostipa wakoolica	A spear-grass	Species									Yes	Yes	Yes	Yes
Commersonia procumbens	-	Species	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
**Tylophora linearis*	-	Species	Yes	Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes
**Lepidium monoplocoides*	Winged Peppercress	Species	Yes	Yes									Yes	Yes
Mammals														
Phascolarctos cinereus	Koala (Breeding)	Species/Ecosystem	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Species not predicted in the BAM Credit Calculator (OEH, 2017e), however added to the Species Credit Species for Assessment based on nearby records by AMBS (2017b).

Highlighted cells – months surveyed by AMBS (2017a) (Attachment B)

4.2.5 Step 5: Determine the Area or Count, and Location of Suitable Habitat for a Species Credit Species

As a result of the surveys by AMBS (2017a) (Attachment B), no species credit species are present, or are likely to use habitat on the Subject land (Table 9).

Table 9
Candidate Species Credit Species – Presence Status

Scientific Name	Common Name	Class of Credit	Result (AMBS (2017a) (Attachment B))
Austrostipa wakoolica	A spear-grass	Species	Not recorded, despite targeted surveys.
Commersonia procumbens	-	Species	Not recorded, despite targeted surveys.
**Tylophora linearis*	-	Species	Not recorded, despite targeted surveys.
**Lepidium monoplocoides*	Winged Peppercress	Species	Not recorded, despite targeted surveys.
Phascolarctos cinereus	Koala (Breeding)	Species/Ecosystem	Not recorded, despite targeted surveys. No primary feed trees for the Koala are located in the Development Site Footprint. One secondary feed tree, Grey Box (*E. microcarpa*), is present in the Development Site Footprint represented by one isolated tree. No evidence of Koala use (scats or scratches) was found. It is unlikely that the Koala uses the habitat in the Development Site Footprint.

The small areas of bare ground without native vegetation (cleared land) associated with existing tracks/roads (Figure 5) is not considered to be habitat for any of the species credit species.

4.2.6 Step 6: Determine the Habitat Condition within the Species Polygon for Species Assessed by Area

Step 6 was not relevant as no species credit species are present, or are likely to use the Subject land (Table 9).

4.3 LOCAL DATA

It was not necessary use local data to deviate from the OEH databases (OEH, 2017b).

4.4 EXPERT REPORTS

No expert reports are required because there are no candidate species credits species (Table 7) that were not surveyed for by AMBS (2017a) (Attachment B) (Tables 8 and 9).

5 AVOID AND MINIMISE IMPACTS

5.1 MEASURES TO AVOID AND MINIMISE IMPACTS

The impact avoidance, minimisation and offset hierarchy has been applied to the Modification. Following the initial survey work by AMBS (2017a) (Attachment B), the modified accommodation camp has been located solely within previously cleared/cultivated land with low biodiversity values. The vegetation is the poorest occurrence of PCT 217, which is not a threatened ecological community.

Clean TeQ has designed the modified accommodation camp (and its development footprint) to be a suitable size to accommodate approximately 1,300 personnel. The supporting infrastructure has been specifically designed by Clean TeQ to avoid intact native vegetation and habitat features for species credit species (Figure 9). Alternative routes and locations were considered for the site access road, accommodation camp ETL and accommodation camp water pipeline in order to avoid and/or minimise impacts on biodiversity values. The refinements in Table 10 were made to the design of the Modification.

Table 10
Measures to Avoid and Minimise Impacts

Component	Refinement	Justification for the Development Footprint
Site Access Road	• The turnoff to the site access road from Sunrise Lane was located in a previously cleared section of the road reserve in order to avoid clearance of the Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1a) (Figure 5). • The site access road traverses the first order drainage feature in the alignment of an existing track in order to avoid clearance of the Green Mallee Low Woodland (Vegetation Community 1b) (Figure 5). • The Development Site Footprint corridor associated with site access road is 8 m wide across the drainage feature (reduced from 9 m) in order to avoid clearance of the Green Mallee Low Woodland (Vegetation Community 1b) (Figure 5).	• The site access road is located solely within previously cleared/cultivated land with low biodiversity values. • The site access road avoids habitat trees.
Accommodation Camp ETL (between the mine site and the accommodation camp)	• The ETL was originally proposed to occur along Sunrise Lane but re-aligned in order to avoid clearance of Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1a) (Figure 5). • The ETL was aligned to avoid paddock trees with habitat features for species credit species. • The ETL passes through an existing gap (approximately 17 m wide) in Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1a) (Figure 5) along Wilmatha Road.	• The ETL is located solely within previously cleared/cultivated land with low biodiversity values. • The ETL is located in the same corridor as the water pipeline. • The ETL avoids trees, except two 4 m high acacia trees.
Accommodation Camp Water Pipeline (between the mine site and the accommodation camp)	• The water pipeline was originally proposed to occur along Sunrise Lane but was re-aligned in order to avoid clearance of Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1a) (Figure 5). • The water pipeline was aligned to avoid paddock trees with habitat features for species credit species.	• The water pipeline is located solely within previously cleared/cultivated land with low biodiversity values. • The water pipeline is located in the same corridor as the ETL. • The water pipeline avoids trees, except two 4 m high acacia trees.

Table 10 (Continued)
Measures to Avoid and Minimise Impacts

Component	Refinement	Justification for the Development Footprint
Temporary Construction (Laydown) Areas	• Temporary construction (laydown) areas would be within the operational Development Site Footprint.	• Temporary construction (laydown) areas are located within proposed footprint (no additional footprint for construction).
Irrigation Water Pipeline	• Irrigation water pipeline was originally proposed to occur across Low lying area with Derived Native Grassland (Vegetation Community 2) (equivalent to the Grey Box EEC) (Figure 5) but would instead be placed beside an existing track.	• Irrigation water pipeline would be placed beside an existing track such that no native vegetation clearance would be required.

There were no alternative sites on the Sunrise Property which could further avoid and/or minimise impacts on biodiversity values. There are no proposed alternative modes or technologies that would further avoid and/or minimise impacts on biodiversity values associated with the Modification.

Measures to manage and mitigate impacts are described in Section 5.6.

5.2 DIRECT IMPACTS ON NATIVE VEGETATION AND HABITAT

5.2.1 Clearance of Habitat and Vegetation

After applying the measures to avoid and/or minimise impacts on biodiversity values (Section 5.1), the Modification would result in the clearance of approximately 27.5 ha of previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs. Most of the Development Site Footprint has been previously cultivated, with scattered trees comprising Green Mallee (*Eucalyptus viridis*), Kurrajong (*Brachychiton populneus* subsp. *populneus*), *Acacia doratoxylon, Casuarina cristata* and Grey Box tree (*Eucalyptus microcarpa*). Scattered trees which could provide habitat for threatened species credit species were surveyed and any trees with potential habitat for species credit species (which were located near the access road, ETL and water pipeline) were avoided (Figure 9).

No threatened ecological communities listed under the BC Act or EPBC Act would be cleared for the Modification.

5.2.2 Irrigation

The treated waste water produced from the sewage treatment plant would be pumped to the irrigation area via the irrigation water pipeline during operation of the accommodation camp (Figure 2). The irrigation water pipeline would be laid on the ground beside an existing track, as such, no native vegetation would be cleared.

The irrigation of the treated waste water would be undertaken in accordance with the *Environmental Guidelines Use of Effluent by Irrigation* (DEC, 2004b). The irrigation area is approximately 10.5 ha over previously cleared land with advanced grassland/shrubland regeneration (PCT217) (Vegetation Community 1d) (Plates 2a and 2b). The proposed irrigation is unlikely to adversely impact the native vegetation because:

- the irrigation rate would not cause irrigation water runoff from the irrigation area; and
- the irrigation rate would not exceed the capacity of the soil in the irrigation area to effectively absorb the applied nutrient, salt, organic material and hydraulic loads.

For the same reasons above, the proposed irrigation is unlikely to adversely impact the low-lying area with Derived Native Grassland (PCT 82) (Vegetation Community 2)[7] which occurs south of the proposed irrigation area (separated by the access track to the existing homestead) (Plates 3 and 4).

5.3 INDIRECT IMPACTS ON NATIVE VEGETATION AND HABITAT

Habitat and vegetation adjacent to the Development Site Footprint is shown on Figure 5. Much of the area adjacent to the Development Site Footprint has been previously cleared of the remnant vegetation. There are two areas of remnant vegetation adjacent to the Development Site Footprint, the Green Mallee Low Woodland (Vegetation Community 1b) along the site assess road and Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1b) along the ETL.

Threatened fauna records adjacent to the Development Site Footprint are shown on Figures 8a and 8b. Only one threatened species, the Grey-crowned Babbler (eastern subspecies) has been recorded in the Development Site Footprint (Figures 8a).

Indirect impacts on habitat and vegetation adjacent to the Development Site Footprint listed in the BAM (OEH, 2017a) are assessed below.

5.3.1 Inadvertent Impacts on Adjacent Habitat or Vegetation

Inadvertent impacts on adjacent habitat or native vegetation could occur in the short-term during construction or operation of any development such as the Modification, e.g. clearance of vegetation outside of approved disturbance limits.

To minimise the risk of inadvertent impacts during the Project, a vegetation clearance protocol has been prepared (Section 5.6). Particular attention would be given to avoiding impacts on trees with potential habitat for species credit species (Figure 9).

5.3.2 Impacts on Adjacent Habitat or Vegetation from a Change in Land-Use Pattern (Increased Human Activity)

Habitat and vegetation adjacent to the Development Site Footprint is described in Section 5.3.1. The accommodation camp would increase the human activity on the Sunrise Property during operation of the accommodation camp in the short to medium term. No adverse impacts are likely to result on habitat and vegetation adjacent to the Development Site Footprint due to the increase human activity on the Sunrise Property. Vehicle strike is assessed in Section 5.4.

[7] Derived Native Grassland (PCT 82) (Vegetation Community 2) is a degraded example of the BC Act listed community *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* and the EPBC Act listed community *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia* (AMBS, 2017a) (Attachment B).

Plate 2a Irrigation Area – Previously Cleared Land with Advanced Grassland/Shrubland Regeneration

Plate 2b Irrigation Area – Previously Cleared Land with Advanced Grassland/Shrubland Regeneration from Driveway

Plate 3 Driveway to Existing Homestead

Plate 4 Derived Native Grassland (PCT 82) (Vegetation Community 2) South of the Access Road to Existing Homestead and Proposed Irrigation Area

5.3.3 Reduced Viability of Adjacent Habitat Due to Edge Effects

Edge effects can occur from a change in physical and/or biological conditions at edges of habitat. No notable edge effects from noise, dust or light spill are likely to result on habitat and vegetation adjacent to the Development Site Footprint during construction or operation.

Sediment control structures such as sediment dams and sediment fences would be employed where necessary within and downstream of disturbance areas. Sediment control structures would be designed, installed and maintained in accordance with *Managing Urban Stormwater: Soils and Construction* in accordance with Condition 29, Schedule 3 of Development Consent DA 374-11-00.

5.3.4 Reduced Viability of Adjacent Habitat Due to Noise, Dust or Light Spill

The accommodation camp is unlikely to reduce the viability of any adjacent habitat due to noise, dust or light spill during construction or operation. Noise from the Modification would likely be localised and minor in impact to fauna.

Whilst ensuring that operational safety is not compromised, Clean TeQ would minimise light emissions from the Project by select placement, configuration and direction of lighting to reduce off-site nuisance effects where practicable. All external lighting at the Project would be operated in accordance with Australian Standard 4282 (INT):*1997 – Control of Obtrusive Effects of Outdoor Lighting.*

5.3.5 Transport of Weeds and Pathogens from the Site to Adjacent Vegetation

Agricultural activities would continue to occur on the Sunrise Property outside the accommodation camp area, including weed control. No high threat, exotic weeds were recorded by AMBS (2017a) (Attachment B). Weed control would be undertaken during construction and operation of the modified accommodation camp in the short to medium term (Section 5.6).

No vegetation pathogens are likely to be relevant to the construction and operation of the modified accommodation camp.

5.3.6 Increased Risk of Fauna Starvation, Exposure and Loss of Shade or Shelter

Clearing the isolated trees may result in displacement of resident fauna. The accommodation camp is proposed to be constructed solely within the previously cleared/cultivated land with low biodiversity values. Scattered trees which could provide habitat for threatened species credit species were surveyed and any trees with potential habitat for species credit species would be avoided.

A vegetation clearance protocol has been prepared, which would include a pre-clearance survey to minimise impacts on displaced fauna during vegetation clearance activities.

5.3.7 Loss of Breeding Habitats

Scattered trees in the Development Site Footprint are likely to be used as breeding habitat for a number of non-threatened bird and bat species. The loss of these breeding habitat resources during construction is unlikely to adversely impact these species. Particular attention would be given to avoiding impacts on trees with potential habitat for species credit species (Figure 9).

5.3.8 Trampling of Threatened Flora Species

No threatened flora species have been located in areas at risk of trampling during construction or operation of the Modification. The *Tylophora linearis* found on Sunrise Lane (Figure 7) is not near the Development Site Footprint.

5.3.9 Inhibition of Nitrogen Fixation and Increased Soil Salinity

The Modification would not inhibit nitrogen fixation or increase soil salinity. Irrigation would be undertaken as described in Section 5.2.2.

5.3.10 Fertiliser Drift

The Modification would not involve the use of fertiliser, except in small quantities to assist with revegetation works.

5.3.11 Rubbish Dumping

The Modification would not involve rubbish dumping. Rubbish generated by the accommodation camp would be disposed of appropriately in designated areas.

5.3.12 Wood Collection

Collection of wood from surrounding native vegetation (for fires or other activities) would not be permitted at the accommodation camp.

5.3.13 Bush Rock Removal and Disturbance

No notable bushrock areas which may provide habitat for fauna occur in the Development Site Footprint.

5.3.14 Increase in Predatory Species Populations

The Modification is unlikely to increase predatory species populations (such as Cat [*Felis catus*] and Red Fox [*Vulpes vulpes*]) (Section 5.3.15).

5.3.15 Increase in Pest Animal Populations

Agricultural activities would continue to occur on the Sunrise Property outside the accommodation camp area, including control of pest animal populations. AMBS (2017a) (Attachment B) recorded the Cat, Red Fox, European Brown Hare (*Lepus capensis*) and European Rabbit (*Oryctolagus cuniculus*) during surveys. The Modification is unlikely to increase pest animal populations.

5.3.16 Increased Risk of Fire

The modified accommodation camp would include fire-fighting infrastructure (e.g. fire water tank and reticulation system) to enable a timely response to fire outbreaks (were they to occur).

5.3.17 Disturbance to Specialist Breeding and Foraging Habitat

Scattered trees which could provide habitat for threatened species credit species were surveyed and any trees with potential habitat for species credit species were avoided.

5.4 PRESCRIBED BIODIVERSITY IMPACTS

The NSW *Biodiversity Conservation Regulation, 2017* identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme. Prescribed Biodiversity Impacts are as follows:

(a) the impacts of development on the following habitat of threatened species or ecological communities:

(i) karst, caves, crevices, cliffs and other geological features of significance,

(ii) rocks,

(iii) human made structures,

(iv) non-native vegetation,

(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,

(c) the impacts of development on movement of threatened species that maintains their lifecycle,

(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),

(e) the impacts of wind turbine strikes on protected animals,

(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

These impacts are assessed below in relation to the Modification.

(a) the impacts of development on the following habitat of threatened species or ecological communities:

(i) karst, caves, crevices, cliffs and other geological features of significance,

(ii) rocks,

(iii) human made structures,

(iv) non-native vegetation,

The Modification is unlikely to result in this Prescribed Biodiversity Impact because:

- there are no karst, caves, crevices, cliffs or other areas of geological significance on the Subject land or within the assessment area surrounding the Subject land (Section 2.6);
- there are no threatened species which are likely to be associated with any rocks that occur on the Subject land or within the assessment area surrounding the Subject land;
- there are no human made structures that provide habitat for threatened species would be adversely impacted by the Modification; and
- AMBS (2017a) (Attachment B) did not map any non-native vegetation on the Subject land or within the assessment area surrounding the Subject land.

(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

As described in Section 2.3, any native vegetation on Figure 4 may facilitate the movement of one or more threatened species across their range. The Modification would not impact on the connectivity of different areas of habitat of threatened species that facilitates the movement of threatened species across their range. Scattered trees in the Development Site footprint would be removed, however there is sufficient connectivity in absence of those scattered trees in which threatened species can move.

For the purpose of this assessment, the Development Site Footprint corridor associated with ETL and water pipeline is conservatively approximately 9 m wide. The ETL would pass through an existing gap in Green Mallee, Mugga Ironbark, Grey Box Woodland (Vegetation Community 1a) near Wilmatha Road, approximately 17 m wide.

The Development Site Footprint corridor associated with site access road from Sunrise Lane is approximately 9 m wide, and approximately 8 m wide across the drainage feature (in an existing cleared track/gap between the Green Mallee Low Woodland.

(c) the impacts of development on movement of threatened species that maintains their lifecycle

The Modification would not impact on the movement of threatened species that maintains their lifecycle for the reasons described in (b) above.

(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)

The Modification would not result in this Prescribed Biodiversity Impact because the Modification would not impact water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

(e) the impacts of wind turbine strikes on protected animals

The Modification would not result in this Prescribed Biodiversity Impact because the Modification does not include the use of wind turbines.

(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community

The Modification would result in an increase in vehicle traffic. The modified accommodation camp would provide increased accommodation camp capacity (from approximately 1,000 to 1,300 personnel) compared to the approved accommodation camp. The modified accommodation camp (at reduced capacity) would be maintained post-construction rather than be decommissioned as was proposed for the approved accommodation camp.

The modified accommodation camp would require the construction workforce to travel on public roads (Sunrise Land and Wilmatha Road) between the accommodation camp and the mine site (approximately 2 km). Traffic generated to and from the modified accommodation camp is expected to include (GTA Consultants, 2017):

- travel by resident employees to and from the mine site;
- recreational travel by resident employees;
- bus trips to and from Parkes Airport; and
- delivery trips of consumables and supplies.

GTA Consultants (2017) have assumed an average of 162 and peak of 289 vehicle trips each day by resident employees to and from the mine site, however the number would be much less with a shuttle bus system.

The BAM (OEH, 2017a) states:

> *The assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community must:*
>
> *(a) identify the range of threatened animal species or animals that are part of a threatened ecological community at risk of vehicle (or other transport mode) strike*
> *(b) predict the likelihood of vehicle strike to each relevant species, taking into consideration mobility, abundance, range and other relevant life history factors*
> *(c) estimate vehicle strike rates where supporting data or literature is available*
> *(d) predict the consequences of the impacts for the local and bioregional persistence of the suite of relevant species, with reference to relevant literature and other published sources of information.*

These components are discussed below.

> *(a) identify the range of threatened animal species or animals that are part of a threatened ecological community at risk of vehicle (or other transport mode) strike*

Any threatened birds or bats on Figures 8a and 8b are potentially at risk of vehicle strike. Species recorded between the accommodation camp and the mine site are Major Mitchell's Cockatoo, Superb Parrot, Grey-crowned Babbler, Yellow-bellied Sheathtail Bat and Little Pied Bat. These species are considered relevant species for the purpose of this assessment.

> *(b) predict the likelihood of vehicle strike to each relevant species, taking into consideration mobility, abundance, range and other relevant life history factors*

The likelihood of vehicle strike on the Major Mitchell's Cockatoo, Superb Parrot, Grey-crowned Babbler, Yellow-bellied Sheathtail Bat and Little Pied Bat is considered low because:

- existing public roads would be travelled (there may be a greater risk if new roads were proposed through intact habitat); and
- there would be a relative short distance of travel between the modified accommodation camp and the mine site (approximately 2 km).

> *(c) estimate vehicle strike rates where supporting data or literature is available*

Vehicle strike rates are estimated to be low for the reasons outlined above.

(d) predict the consequences of the impacts for the local and bioregional persistence of the suite of relevant species, with reference to relevant literature and other published sources of information.

The consequence of the impacts from vehicle strike are predicted to be negligible as the Major Mitchell's Cockatoo, Superb Parrot, Grey-crowned Babbler, Yellow-bellied Sheathtail Bat and Little Pied Bat are known to occur more widely than between the accommodation camp and the mine site.

5.5 IMPACTS ON COMMONWEALTH THREATENED SPECIES AND COMMUNITIES

The Modification is unlikely to impact (or significantly impact) any threatened species or communities listed under the EPBC Act as none have been confirmed to occur near the Development Site Footprint (Figures 8a and 8b) and the modified accommodation camp is proposed to be constructed solely within the previously cleared/cultivated land with minimal biodiversity values. A review of threatened species or communities listed under the EPBC Act is provided in Attachment D considering Department of the Environment, Water, Heritage and the Arts (2013).

5.6 IMPACTS ON THREATENED SPECIES AND COMMUNITIES UNDER THE NSW FISHERIES MANAGEMENT ACT, 1994

The Modification is unlikely to impact (or significantly impact) any threatened species or communities listed under the NSW *Fisheries Management Act, 1994*.

The site access road follows an existing track which crosses a shallow first order ephemeral drainage feature through an existing track (Figures 3 and 4). The accommodation camp water pipeline and ETL also traverse shallow first order ephemeral drainage features that occur through the cultivated paddock (Figures 3 and 4).

5.7 MEASURES TO MITIGATE AND MANAGE IMPACTS

As described in Section 5.1, the modified accommodation camp has been specifically located and designed to avoid and minimise impacts on biodiversity values, including native vegetation and potentially occurring threatened species. The modified accommodation camp is proposed to be constructed solely within the previously cleared/cultivated land with minimal biodiversity values. The Modification would result in the clearance of approximately 27.5 ha of previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs (Plant Community Type 217). Scattered trees would need to be cleared for the Modification, however those which could provide habitat for threatened 'species credit species' were surveyed and such trees would be avoided.

Clean TeQ will prepare a *Biodiversity Management Plan* (BMP) for the Project in accordance with Development Consent DA 374-11-00. The BMP would provide vegetation clearance protocol as well as measures to prevent and control weeds and pest animals. Table 11 provides measures to mitigate and manage impacts from the Modification. Clean TeQ would be responsible for implementing the measures.

After the measures to mitigate and manage impacts, there would be a negligible risk to biodiversity with a low consequence (e.g. individual fauna lost during controlled vegetation clearing works). Fire prevention is required to avoid a risk of bushfire outbreak.

Table 11
Measures to Mitigate and Manage Impacts

Mitigation Measure	Techniques	Timing/Frequency	Potential Risk	Contingency Measure
Vegetation Clearance Protocol - Timing of tree clearance	Trees used for nesting would not be felled until young have left the nest, where possible.	Prior to clearing	Trees used for nesting are accidently felled.	A suitably qualified person(s) will be present during clearing of habitat trees to manage vertebrate animals.
Vegetation Clearance Protocol - Pre-clearance Surveys	Pre-clearance vertebrate fauna surveys would be undertaken in two stages: • identify habitat features that could harbour vertebrate fauna and place them at risk during vegetation clearance activities (e.g. tree hollows), or features that could be salvaged and reused such as mature trees and stags; and • identify vertebrate fauna most likely to be at risk during vegetation clearance activities and those that would be managed during clearing activities.	Within two weeks prior to clearing.	Trees with habitat features with vertebrate fauna inside are accidently felled.	A suitably qualified person(s) will be present during clearing of habitat trees to manage vertebrate animals.
Vegetation Clearance Protocol - Delineating clearing limits	Approved disturbance limits near areas to be cleared would be delineated on the ground prior to clearing activities (e.g. flagging tape and posts). Scattered trees which could provide habitat for threatened 'species credit species' (Figure 9) would specifically be identified with flagging tape during nearby construction works.	Prior to clearing	Incidental clearing	Review and adapt current Vegetation Clearance Protocol procedures.
Staff and Contractor Inductions	Initial staff and contractor inductions would include the following: • measures to reduce the occurrence of fauna-vehicle collisions; and • bushfire prevention and management strategies.	During staff and contractor inductions.	Increase in incidents.	Review induction content and update.
Weed Control	Agricultural activities would continue to occur on the Sunrise Property outside the modified accommodation camp area (including the management of weeds). Additional weed monitoring and control would be undertaken around the accommodation camp, as necessary.	Commence within six months of construction activities and be implemented twice a year, every six months (or at other times when rainfall conditions are favourable to weed outbreaks).	Weed invasion – perennial and annual grasses, perennial herbs, annual and biennial herbs and woody weeds.	Review additional strategies to control target weed species. Increase the frequency of weed control and monitoring.

Table 11 (Continued)
Measures to Mitigate and Manage Impacts

Mitigation Measure	Techniques	Timing/Frequency	Potential Risk	Contingency Measure
Feral Animal Control	Agricultural activities would continue to occur on the Sunrise Property outside the modified accommodation camp area (including the management of feral animals). Additional feral animals monitoring and control would be undertaken around the accommodation camp, as necessary. Domestic pets will not be allowed at the accommodation camp. The accommodation camp will be kept as a clean, rubbish-free environment in order to discourage scavenging and reduce the potential for colonisation of these areas by non-endemic fauna (e.g. rodents) The accommodation camp inhabitants would not be permitted to keep native fauna or to encourage fauna through feeding.	Control measures would be implemented by mine staff or by an appropriate Pest Control Contractor(s) as required.	Sustained increase in feral animal numbers despite control measures.	Review additional strategies to control target feral animals. Increase the frequency of feral animal control and monitoring.
Bushfire Control	Bushfire management measures at the Project will be implemented in accordance with Condition 49, Schedule 3 of Development Consent DA 374-11-00 and would include the site being suitably equipped to fight fires; develop asset protection in accordance with the Rural Fire Service's Planning for Bushfire Protection 2006; and consultation with the Rural Fire Service. The modified accommodation camp would include fire-fighting infrastructure (e.g. fire water tank and reticulation system).	Upon commencement of the Modification.	Unplanned bushfire over the Subject land.	Inspect and remedy issues with fences, gates or access. Re-evaluate the required management.

6 IMPACT SUMMARY

6.1 SERIOUS AND IRREVERSIBLE IMPACTS

No SAII Entities listed in the *Threatened Biodiversity Data Collection* (OEH, 2017c) occur in the Development Site Footprint (Section 4.2.3).

6.2 IMPACTS ON NATIVE VEGETATION (ECOSYSTEM CREDITS)

The BAM (OEH, 2017a) states:

> *The assessor is required to determine an offset for all impacts of development or impacts from the conferral of biodiversity certification on PCTs that are associated with:*
>
> *(b) a vegetation zone that has a vegetation integrity score of ≥ 17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community*

As stated in Section 3.3.3, according to the BAM Credit Calculator (OEH, 2017e), the Vegetation Community 1d (Vegetation Zone 1) has a Vegetation Integrity Score of 16.6 (<17). Therefore, no ecosystem credits are required for the Modification[8].

6.3 IMPACTS ON THREATENED SPECIES (SPECIES CREDITS)

As a result of the surveys by AMBS (2017a) (Attachment B) and measures to avoid and minimise impacts (Section 5.1), no species credit species are present, or are likely to use the Subject land/Development Site Footprint (Table 9). No species credits are required for the Modification (Attachment E).

[8] The BAM Credit Calculator (OEH, 2017e) indicates that credits are required for the Modification (Attachment E). OEH (6 December 2017) confirmed that there is an error with the BAM Credit Calculator (OEH, 2017e) and that it should not require credits if the Vegetation Integrity Score is below the relevant threshold in the BAM (2017a).

7 CONCLUSION

The modified accommodation camp has been specifically located and designed to avoid and minimise impacts on biodiversity values, including native vegetation and potentially occurring threatened species. The modified accommodation camp is proposed to be constructed solely within the previously cleared/cultivated land with minimal biodiversity values. The Modification would result in the clearance of approximately 27.5 ha of previously cleared land with regrowth of predominantly native grasses, herbs and low shrubs (Plant Community Type 217). Scattered trees would need to be cleared for the Modification, however those which could provide habitat for threatened 'species credit species' were surveyed and such trees would be avoided.

No threatened ecological communities listed under the BC Act or EPBC Act would be cleared for the Modification. Only one threatened species, the Grey-crowned Babbler (eastern subspecies) listed as 'Vulnerable' under the BC Act has been recorded in the Development Site Footprint. This species is an ecosystem credit species.

According to the BAM Credit Calculator, no ecosystem credits required for the Modification because the Vegetation Integrity Score (a score generating by the BAM Credit Calculator as a measure of the site condition) is less than 17 (16.6). In accordance with the BAM, no species credits are required for the Modification because no species credit species are present, or are likely to use the land associated with the Development Site Footprint.

Clean TeQ will prepare a *Biodiversity Management Plan* (BMP) for the Project in accordance with Development Consent DA 374-11-00 and it would include the Modification. The BMP would provide vegetation clearance protocol for the Modification as well as measures to prevent and control weeds and pest animals. Agricultural activities would continue to occur on the Sunrise Property outside the modified accommodation camp area.

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