



Appendix 6

Biodiversity Development Assessment

prepared by
EnviroKey Pty Ltd

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ENVIRONMENTAL IMPACT STATEMENT

Grantham Park Holdings Pty Limited
Bungendore Sands Extension Project

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Biodiversity Development Assessment Report

**Proposed extension of Grantham Park Sand
Quarry, Bungendore, NSW**



**A report prepared for RW Corkery on behalf of Grantham Park
Holdings Pty Ltd**

MARCH 2020

Report No. 19.BDAR-090

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Definitions & Acronyms used within this report

Activity	The nature of the proposed activity, as described in section 1.2
BAM	Biodiversity Assessment Methodology
BC Act	NSW Biodiversity Conservation Act 2016
BC Reg	NSW Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
BCF	Biodiversity Conservation Fund
BCT	Biodiversity Conservation Trust
Development footprint	The footprint of the proposed activity, that is the area of direct impact
DoEE	Department of the Environment & Energy
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
IBRA	Interim Bioregionalisation of Australia
LGA	Local Government Area
Likely	taken to be a real chance or possibility
Locality	means the area within a 10 km radius of the proposed activity
migratory species	a species specified in the schedules of the EPBC Act
OEH	NSW Office of Environment & Heritage
PCT	Plant community type
Region	means a biogeographical region that has been recognised and documented such as the Interim Biogeographical Regions of Australia (IBRA) (Thackway and Creswell, 1995). The study area is located within the South Eastern Highlands Bioregion
Study area	includes the Development footprint and any additional areas that are likely to be affected by the proposed activity, either directly or indirectly
Subject site proposed activity	the area to be directly affected by the proposed activity. That is, the footprint of the proposed activity
TEC	threatened ecological community
threatened biota	means those threatened species, endangered populations or endangered ecological communities considered known or likely to occur in the study area
threatened species	a species specified in the schedules of the BC Act or the EPBC Act

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1 INTRODUCTION

Grantham Park Holdings Pty Ltd (GPH) is seeking approval from Queanbeyan – Palerang Regional Council (QPRC) to develop a new sand extraction area on a section of Lot 1, DP 1167699, in order to increase the recoverable sand resource and extend the operational life of the existing extraction and processing operation (“the Quarry”) conducted by Tobiwai Crushing Pty Ltd (“Tobiway”).

The development application is to facilitate continued operations at the Quarry that Tobiwai has been operating under the conditions of a previous development consent. The proposed activity would be assessed as Designated Development under Part 4 of the *Environmental Planning & Assessment Act 1979*, and therefore assessed by Queanbeyan – Palerang Regional Council. As Designated Development for the purpose of extractive industry, the Quarry is also Regional Development under *State Environment Planning Policy (SEPP) (State and Regional Development) 2011* and therefore determination of the application will be by the Joint Regional Planning Panel.

EnviroKey were engaged by RW Corkery and Co Pty Ltd (RWC), to prepare a Biodiversity Development Assessment Report (BDAR) for a proposed development. This BDAR has been prepared by Mr Steven Sass, an Accredited Assessor (BAAS17047) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and is consistent with the Biodiversity Assessment Methodology (BAM) (OEH, 2017). Details of all personnel involved in the field surveys or the preparation of this BDAR are provided in **Appendix 1**.

1.1 PROPOSED ACTIVITY

The proposal would comprise the following:

- Ongoing extraction of sand and limited volumes of overburden and interburden (clay and silt) within the remainder of the Approved Extraction Area and a 77 hectare proposed Extraction Area, to a maximum depth of 10 metres, producing up to 400,000t of sand products per year for a period of 20 years.
- Continued on-site screening, classifying and stockpiling of extracted material to produce a range of sand products using the existing Sand Classification Plant.
- Continued transportation of sand products to the Operator’s customers using a combination of rigid vehicles and truck and dog combinations and existing Quarry Access Road and public transportation routes.
- Continued management and settlement of fines and process water using the existing and proposed Fines Settling Cells and Process Water Ponds.
- Establishment of ancillary infrastructure, including bunds and water management structures.
- Construction and rehabilitation of a final landform that would be safe, stable, non-polluting, and suitable for a future land use of nature conservation and agriculture.

The proposed activity includes all existing infrastructure. For the purpose of this BDAR, only the proposed extraction area is considered, as all other infrastructure is approved and existing as part of the current operation. On that basis, the proposed extraction area includes the proposed Fines Settling Cells and Wetlands to be constructed following the completion of extraction operations.

1.2 STUDY AREA

The study area is located about 31 kilometres northeast of Queanbeyan (**Map 1**). For the purpose of this BDAR, the study area is defined as the Development footprint (ie, the area of direct impact), surrounding areas that may be subject to indirect impacts, and existing operations (**Map 2**).

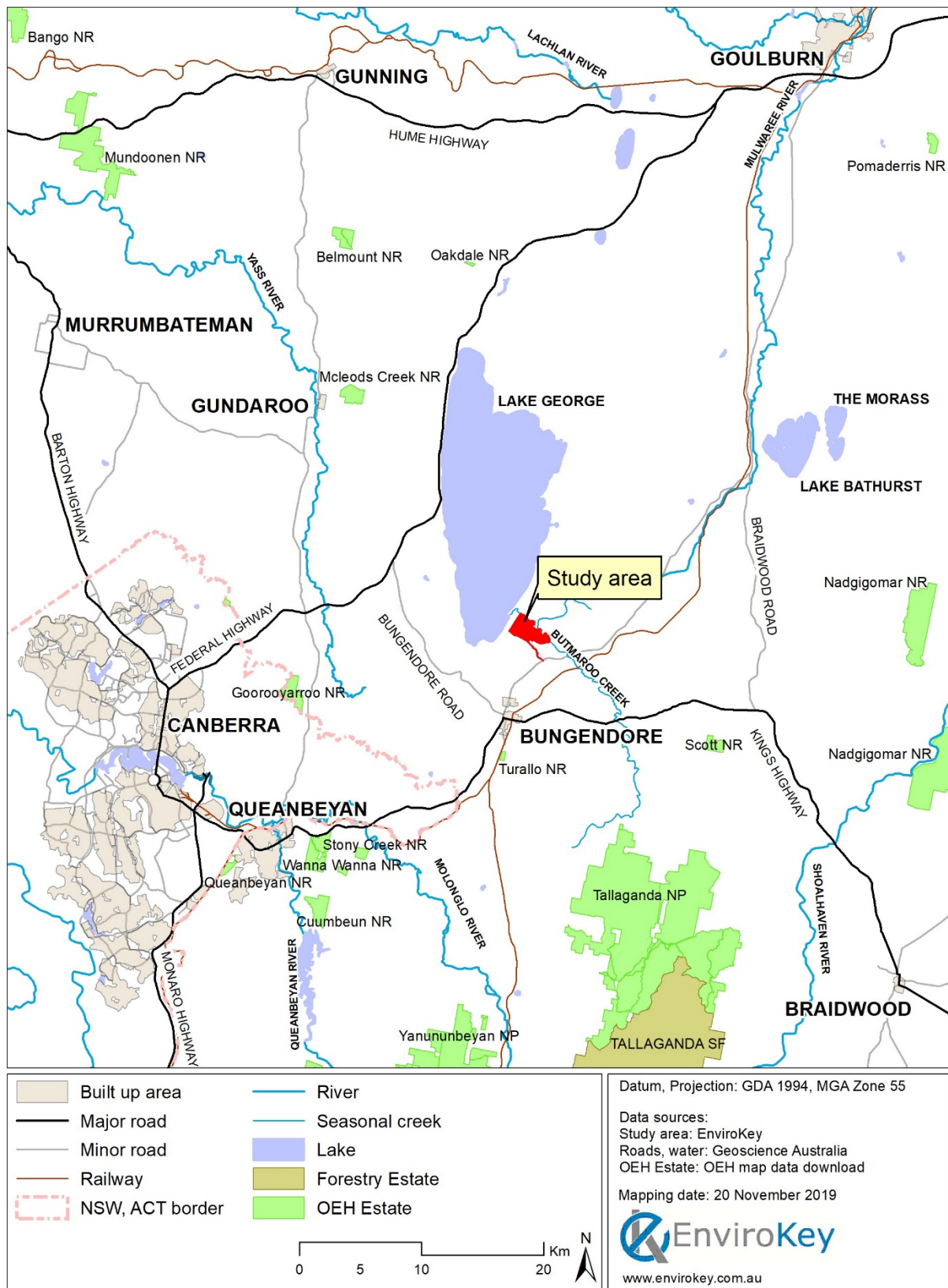
The study area is located within the South East Highlands Bioregion and Monaro IBRA subregion (Thackway and Creswell, 1995, NPWS, 2003), Queanbeyan - Palerang local government area (LGA) and Lake George Complex Mitchell Landscape ((Mitchell, 2002).

1.3 BIODIVERSITY OFFSET SCHEME

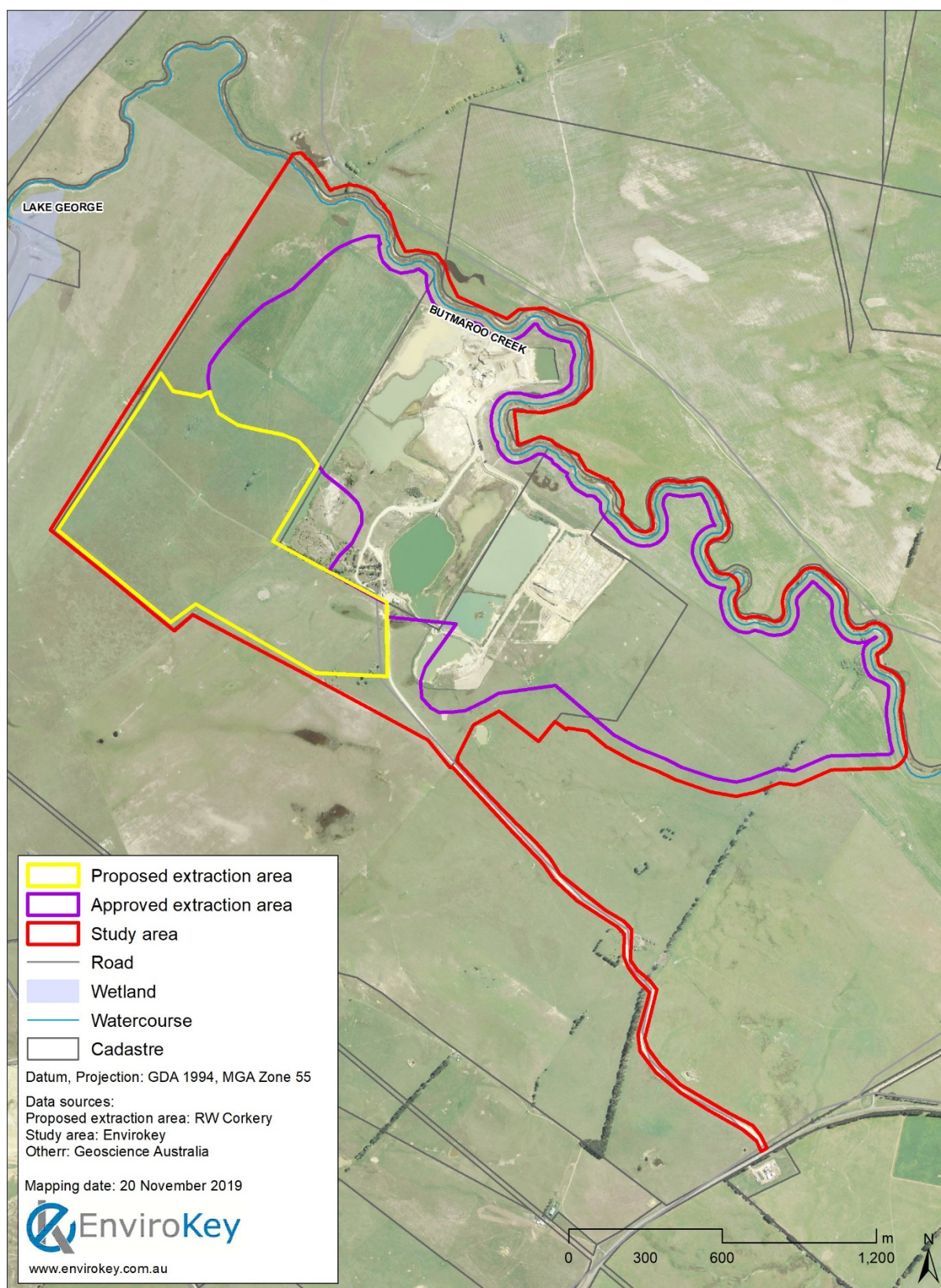
The *Biodiversity Conservation Regulation 2017*, sets out thresholds for when the Biodiversity Offset Scheme (BOS) will be triggered. The threshold has three triggers:

1. Whether the amount of native vegetation being cleared exceeds a threshold based on minimum lot size associated with the property;
2. Whether the area cleared is mapped as 'sensitive' on the Biodiversity Values Map published by the NSW Office of Environment and Heritage; or
3. Whether a significant impact is likely according to a 'test of significance'.

Based on the Biodiversity Offset Scheme Entry Threshold (BOSET) Map provided in **Appendix 2**, the proposed activity exceeds the area clearing threshold of 1 hectare allocated to the subject lot. On this basis, the BOS is triggered and a BDAR is the appropriate assessment pathway.



Map 1: Regional location of the study area.



Map 2: The study area used for this BDAR.

2 LANDSCAPE CONTEXT

2.1 IDENTIFY LANDSCAPE FEATURES

In accordance with the BAM, a number of features are assessed within and surrounding the subject site. This section provides details relating to the IBRA region and subregion and NSW landscape region (Mitchell Landscapes) (**Map 3**). Other landscape features such as rivers, streams, estuaries and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered where appropriate.

2.1.1 *IBRA bioregions and IBRA subregions*

IBRA bioregions represent a landscape-based approach to the classification of land including geomorphology, landform, climate, lithology and characteristic flora and fauna. The proposed extraction area (development footprint) is located entirely within the South East Highlands IBRA region and Monaro IBRA subregion.

2.1.2 *NSW landscape regions (Mitchell Landscapes)*

The proposed extraction area occurs within a single NSW Mitchell Landscape; 'Lake George Complex'. The Lake George Complex comprises closed drainage basins of Quaternary lakes and swamps set within block faulted ranges. They consist of extensive Tertiary quartz gravel, sand and mud overlying Silurian-Devonian gneissic granite and Silurian quartz sandstone and mudstone. The eastern margins have well developed sandy lunettes. The Mitchell landscape has wet tussock grasslands on lake margins, but they are now extensively altered by exotic flora (Mitchell, 2002).

2.1.3 *Other features*

Wetlands

Lake George is located about 1 kilometre west of the proposed extraction area. This is an intermittent water body which appeared to be dry at the time of the field survey. The catchment area is relatively small being 950 km² with the lake itself occupying 16 percent of this area. Land use in the catchment is mainly grazing which accounts for 76 percent. The proposed activity is located within a highly disturbed portion of the Lake George catchment.

Several artificial wetlands also occur within the study area. These consist of farm-style dams that are relatively permanent to shallow, ephemeral wetlands (**Figure 2-1**). These provide habitat for a range of species including waterbirds and frogs.



Figure 2-1: An artificial wetland within the study area

Rivers and streams

Butmaroo Creek flanks the northern boundary of the study area, and at its closest point, is located about 800 metres north of the proposed extraction area.

Within the study area, Butmaroo Creek is a sixth order, highly modified drainage line that flows east to west. It is one of two creeks that enters Lake George at the southern end. Bank stability is likely to be affected by catchment land use being dominated by grazing and historical land clearing increasing water run-off and velocity.

The creek has high levels of bank erosion with highly incised channels and steep sides of around 3-4 metres in height. The channel width is about 10 metres wide.



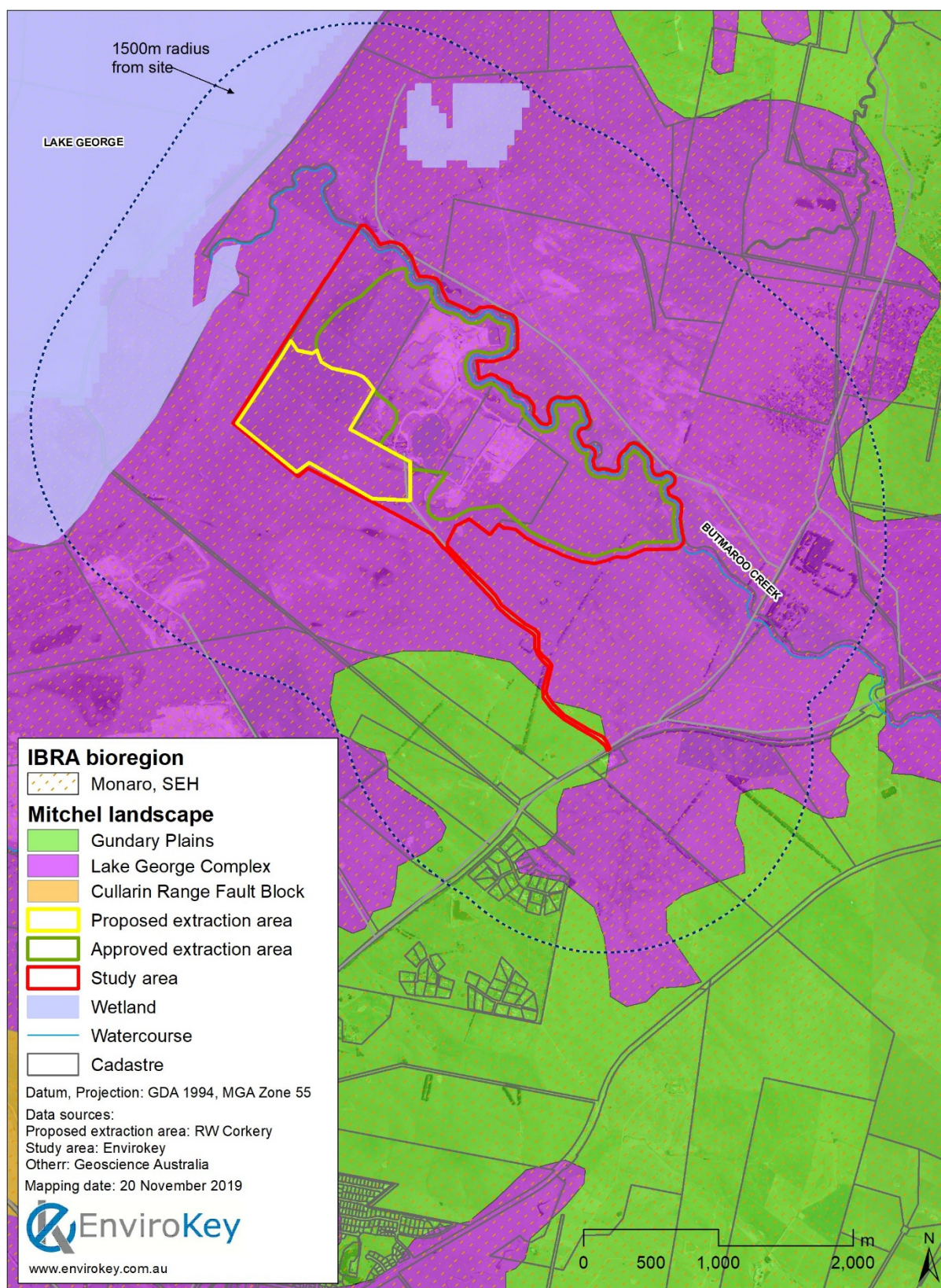
Figure 2-2: Examples of Butmaroo Creek within the study area.

Water depth at the time of the field survey was no greater than about 1 metre, but this was not continuous likely an artifact of the drought conditions during the survey period. No native riparian vegetation was present, nor any fallen timber, although exotic flora cover was good with over 90% cover observed. This was consistent in the fringe vegetation where water was present, with about 90% coverage observed.

Instream habitats were observed to be mostly aquatic flora with emergent narrow and broad leaf habitat cover about 20% and about 1 metre tall. Other aquatic vegetation was observed at about 20% being submerged. No instream woody debris or riffle habitat was present. Small sandbars were exposed due to the low water levels. At the time of the survey, the creek was best described as a series of small pools. Observations of parts of Butmaroo Creek upstream indicate some willow species are present to the east of the study area, with some already becoming established within the study area.

While no water quality testing was carried out, water quality was considered to be relatively good. No obvious odor or discoloration from petrochemical spills was observed or noted. The water was slightly turbid.

Based on our field assessment, the waterway meets the classification of Class 2 Moderate Key Fish Habitat (DPI, 2013).



Map 3: Landscape context of the study area and proposed extraction area.

Connectivity

The study area provides virtually no connectivity to surrounding areas, given the general lack of native vegetation. At best, Butmaroo Creek provides some connectivity from areas in the east to Lake George.

Areas of outstanding biodiversity value

No area of outstanding biodiversity value as identified by the BC Act occurs within the study area.

2.2 DETERMINING SITE CONTEXT

2.2.1 Assessing native vegetation cover

A layer of native vegetation cover is required for a 1,500 metre buffer around the study area to determine the context of the site. As there is no regional mapping held by the NSW Department of Planning, Industry and Environment (DPIE) or in the Sharing and Enabling Environmental Data (SEED) database, the extent of native vegetation within the 1,500 metre buffer was not able to be estimated through desktop analysis with the exception of air photograph interpretation. In the field, many portions of the buffer were not publicly accessible, so a 'best estimate' is made based on combination of minimal field observations and air photograph interpretation.

The total area of the 1,500 metre buffer around the study area is 2,626.44 hectares. The total estimate of native vegetation within the 1,500 metre buffer is 100 hectares. This is a native vegetation cover of 4%, which was entered into the BAM calculator (BAMC) as 4%.

2.2.2 Assessing patch size

Patch size is defined by the BAM as '*an area of native vegetation that:*

- *Occurs on the development site or biodiversity stewardship site, and*
- *Includes native vegetation that has a gap of less than 100 metres from the next area of moderate to good condition native vegetation (or <30 metres for non-woody ecosystems).*

Patch size can extend onto adjoining land that is not part of the development site or biodiversity stewardship site'.

Patch size was calculated using the field validated vegetation types and air photo interpretation. Patch size is required to be assessed as one of four classes per vegetation zone mapped. These being <5 hectares, 5-24 hectares, 25-100 hectares or >100 hectares.

Based upon vegetation mapping and air photo interpretation beyond the subject land, the total area of this patch was calculated at 100 hectares which was applied to the BAMC.

3 NATIVE VEGETATION

3.1 PLANT COMMUNITY TYPES (PCTs) AND THREATENED ECOLOGICAL COMMUNITIES

3.1.1 *Review of existing vegetation mapping*

The study area is within a single vegetation mapping dataset. This being the Palerang LLS Biometric_F_4209 vegetation dataset. The dataset contains a single attribute with no vegetation data contained within. No other vegetation mapping covers the study area or the 1,500m buffer. Given that, we were unable to review existing vegetation mapping.

In 2008, a previous flora and fauna report was prepared that encompasses the study area. Geoff Butler & Associates prepared correspondence which provides some background as to the previous condition of the study area which confirms that the land “has been widely and intensively cultivated and heavily grazed over a long period of time” (GBA, 2008)

3.1.2 *Species richness within the study area*

A total of 28 flora species were recorded from the study area, comprising only five native species (one of which is planted). This confirms the previous work of GBA (2008) demonstrating the highly disturbed nature of the study area.

The species richness recorded, and the high ratio of exotic species present (including high threat exotic flora), is considered typical for the area in the context of the site.

A full flora list is detailed in **Appendix 4**.

3.1.3 *Plant community types*

A field survey of the study area was carried out on 3-4 September 2019. The survey timing was chosen to target threatened flora species identified by the BAMC. Field surveys were undertaken using the following methods:

- 8 BAM plot/transects in accordance with the BAM
- Targeted threatened species surveys (transects across the study area)
- Random meanders across the study area

The study area is situated within a highly modified landscape comprising agricultural activity and current Quarry operations. The surrounding areas within the landscape are also highly modified. The vegetation of the study area is best considered as non-native vegetation (exotic grassland) given the dominance of exotic flora species and pasture grasses and a general paucity of native flora species.

However, native vegetation, as defined by the BC Act, has no definition, except that it has the same meanings as Part 5A of the *Local Land Services Act 2013* (LLS Act). For the purpose of Part 5A of the LLS Act, native vegetation means any of the following types of plants native to NSW:

- Trees
- Understory plants
- Ground covers
- Plants occurring in a wetland

The vegetation within the proposed extraction area, despite being dominated by exotic flora species as an exotic grassland, does have some native species present. While this is in a very low cover range (<5% at best), this BDAR adopts the precautionary principle and the definition of the LLS Act, and assumes native vegetation is present.

At the time of the field survey, vegetation in the study area mainly comprised sown (exotic dominated) pastures. All areas were being grazed by stock, other than the working Quarry sites. In the vicinity of the office/compound was rehabilitated land, comprising mixed plantings of native trees and shrubs. Exotic grasses dominated the groundcover, with a minimal cover of native grasses persisting. Occasional tree belts of *Pinus radiata* were also present.

The dams/artificial wetlands of the former Quarry sites mainly comprised shallow, open water, with a small number of native sedges and rushes along the shallow edges, while exotic grasses dominate the banks.

Butmaroo Creek comprised a heavily grazed and degraded channel dominated by exotic pasture grass species and various agricultural weeds. Only two native species were recorded in the channel, *Juncus* sp. and Broadleaf Cumbungi (*Typha orientalis*).

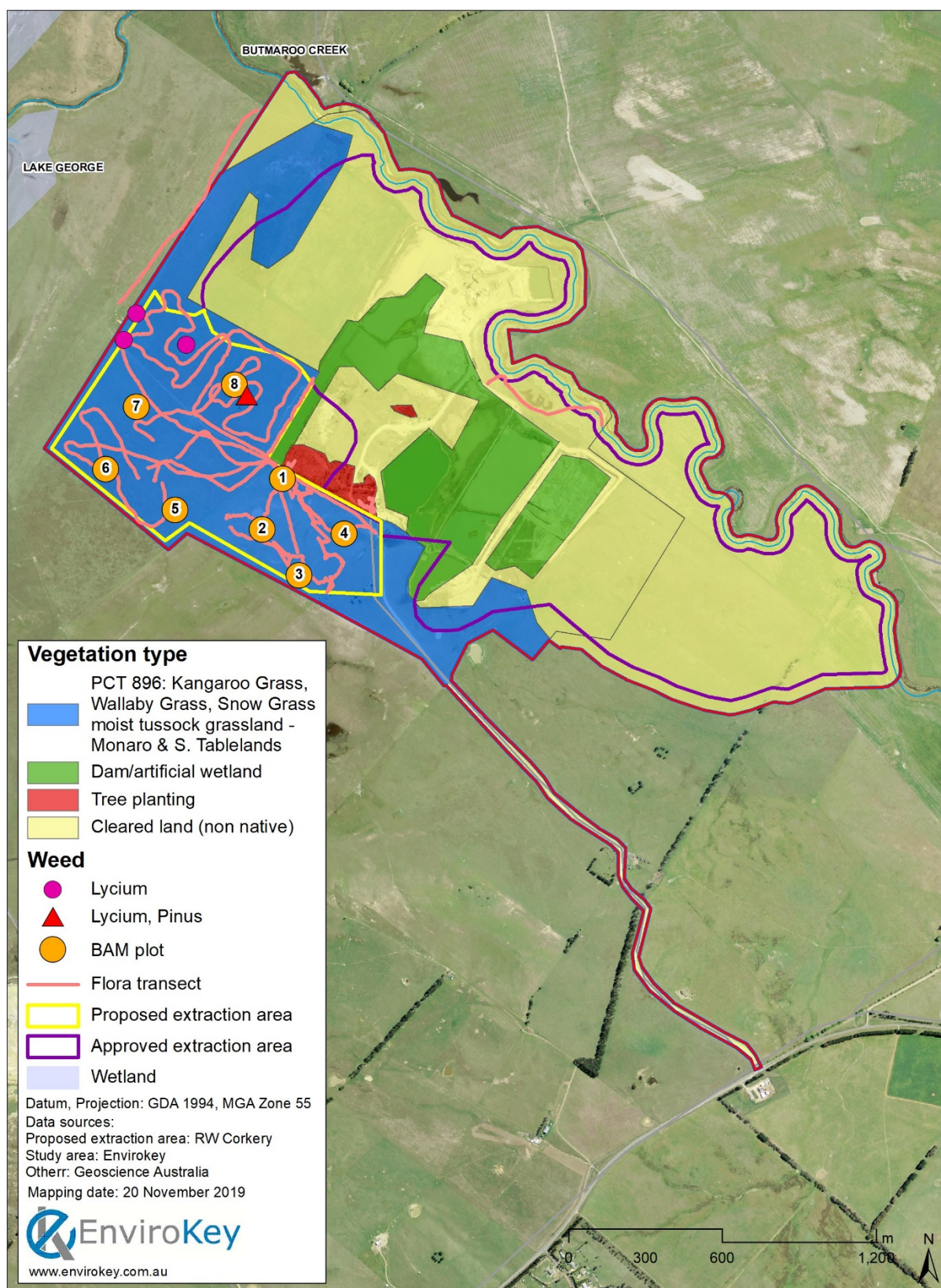
The remainder of the site was mapped as cleared land (non-native), comprising heavily grazed mixed pasture species.

The highly invasive weed, Serrated Tussock (*Nassella trichotoma*) was scattered across much of the study area including the proposed extraction area, as was African Boxthorn (*Lycium ferocissimum*) to a lesser extent.

The flora species recorded within the study area is provided in **Appendix 4**.

Determining the plant community type (PCT) that would have once been present within the study area is difficult given the existing environment being dominated by exotic flora. However, a review of the BioNET Vegetation Classification System indicates that it was most likely PCT 896 Kangaroo Grass – Wallaby Grass – Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion (OEH, 2019b). Given this, and with consideration of the definition of native vegetation under the BC Act as outlined above, we have assumed the proposed extraction area to be PCT 896.

Only a single PCT is present and given that all are managed the same (ie highly degraded), only one vegetation zone is considered present. **Table 1** provides additional information on PCT 896 while the spatial extent is provided in **Map 4**. Photographs of BAM plot/transects are provided in **Figures 3-1 to 3-5**.



Map 4: Plant community types. BAM plot/transects and targeted threatened species transects within the study area and proposed extraction area

Table 1: Plant community types (and conservation status)

Plant community type (PCT)	Vegetation Zones	Threatened ecological community	Area impacted (ha)	Local occurrence(ha)
Kangaroo Grass – Wallaby Grass – Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion (PCT 896)	1	No, not listed under BC Act	76.37	>100
Total			76.37	

**Figure 3-1:** BAM plot/transect no. 1



Figure 3-2: BAM plot/transect no. 2



Figure 3-3: BAM plot/transect no. 8

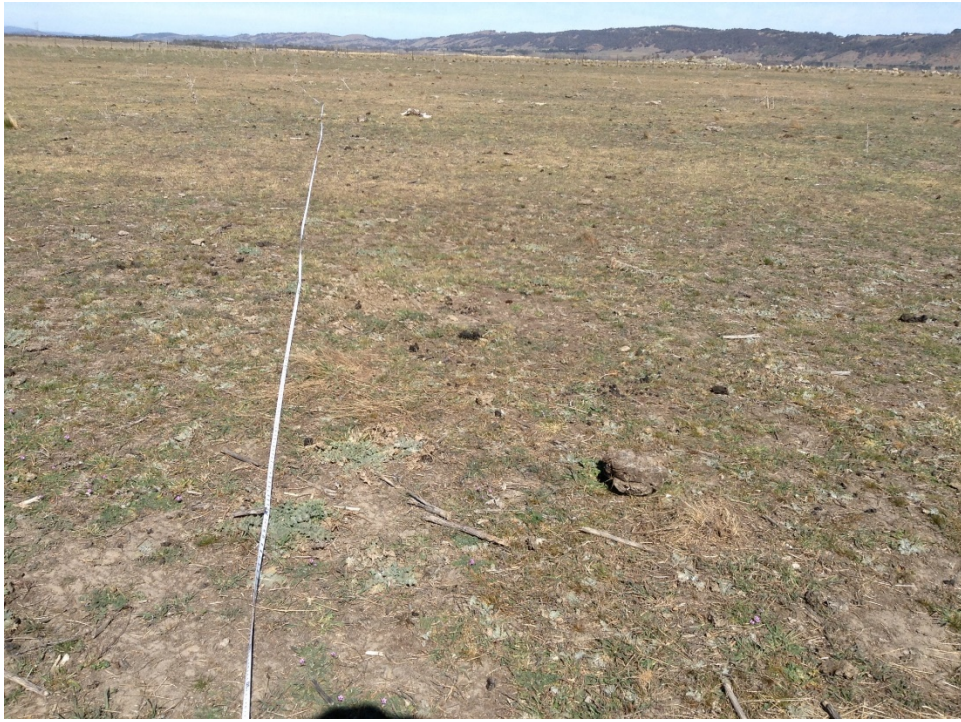


Figure 3-4: BAM plot/transect no. 5



Figure 3-5: BAM plot/transect no. 4

3.2 VEGETATION ZONES

3.2.1 Condition classes, subcategories and areas

The PCT identified within the development site were classified into vegetation zones for the purpose of credit calculations. Given that all of the proposed extraction site is relatively homogenous, a single vegetation zone was adopted for the purpose of the BAMC.

3.2.2 Vegetation integrity survey plots

Eight vegetation integrity survey plots (BAM plots) were completed on the 3-4 September 2019 within the proposed extraction area. The raw data sheets for all BAM plots are included in **Appendix 3**. The spatial location of the BAM plots is provided in **Map 4**.

3.2.3 Current and future vegetation integrity scores

A vegetation integrity score (VIS) was calculated for the vegetation zone based on the 8 BAM plot/transects completed.

The VIS (before development) for Vegetation zone 1 was 1.6/100 (**Table 2**) confirming the very poor condition of the proposed extraction area. For this vegetation zone, the proposed activity would involve the complete removal of all vegetation within the development site. It is assumed that no ground cover would be retained so the score after development would be 0/100. This is a reduction of 1.6

Table 2: Vegetation integrity scores for the vegetation zone, before and after development.

Veg/Mngt zone No.	Plant Community Type	Condition	Area impacted	VIS – before development	VIS – after development
1	PCT 896	Low	76.37	1.6	0

4 THREATENED SPECIES

The BAM details the process for determining the habitat suitability for threatened species (section 6 of BAM). Under BAM, threatened species are separated into two categories; 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or components of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to each PCT.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by landscape features or vegetation surrogates and can be reliably detected by survey are identified as 'species' credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject site, and the results of targeted surveys for candidate threatened species.

4.1 IDENTIFY THREATENED SPECIES FOR ASSESSMENT

Threatened species that require assessment are initially identified based on a specific set of criteria. These being:

- The distribution of the species includes the IBRA subregion of the subject land
- The study area has geographic constraints of the species distribution within the IBRA subregion
- The species is associated with the PCTs of the study area
- Native vegetation cover within a 1,500 metre buffer of the study area exceeds the minimum habitat required for the species
- Patch size exceeds the minimum required for the species
- The species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the criteria is determined by the BAM calculator (BAMC). The PCT identified within the study area, patch size and native vegetation cover (as detailed within section 3 of this BDAR) were entered into the BAMC. This resulted in a preliminary list of threatened species.

4.1.1 Ecosystem credit species

The BAMC identified a range of ecosystem credit species predicted to occur within the proposed extraction area (**Table 3**). Some ecosystem credit species were removed from the list of predicted species on the basis that no habitat was present within the proposed extraction area. These were Speckled Warbler, Brown Treecreeper, Spotted-tailed Quoll and Hooded Robin.

For all other ecosystem credit species generated by BAMC, potential foraging habitat is considered present.

Table 3: Ecosystem credit species predicted within the proposed extraction area

Common Name	Scientific Name	BC Act	EPBC Act
Dusky Woodswallow	<i>Artamus cyanopterus</i>	V	-
Flame Robin	<i>Petroica phoenicea</i>	V	-
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V	-
Scarlet Robin	<i>Petroica boodang</i>	V	-

*V = Vulnerable,

4.1.2 Species credit species

As with ecosystem credit species, species credit species are predicted in the BAMC following an assessment of geographic and habitat features which include the IBRA subregion, PCT, patch size and native vegetation cover in the landscape context.

This section includes further assessment of species credit species to confirm if they will become candidate species for this BDAR (**Table 4**).

Table 4: Assessment of habitat constraints and geographic limitations.

Common name	Habitat constraints / Geographic limitations	Response
Striped Legless Lizard		Habitat highly degraded, no records in the locality. However, is known from exotic grasslands.
Pink-tailed Legless Lizard	Rocky areas or within 50 metres of rocky areas	No rocky areas exist within 50 metres of the proposed extraction area
Rough Eyebright	Montane bogs or within 50 metres	No montane bogs present. Proposed extraction site highly degraded.
Southern Myotis	Bridges, caves or artificial structures	Habitat surrounding features is highly degraded. No breeding habitat present

Common name	Habitat constraints / Geographic limitations	Response
	within 200 metres of riparian zone. Hollow-bearing trees, Within 200 metres of riparian zone	
Large Bent-winged Bat (breeding habitat)	Caves, tunnels, mines, culverts or other structure known or suspected to be used	No such features occur within or adjacent to the proposed extraction area. Post-maternity cave known meeting place (Mt Fairy) is about 13kms east.
Button Wrinklewort	-	Natural Temperate Grassland does not exist in the proposed extraction area. As confirmed by the VIS of 1.6/100, site is highly degraded and species is unlikely to occur and it is highly sensitive to grazing. Very low potential to occur.
Austral Toadflax	-	Proposed extraction area highly modified and degraded. No native grassland present in the context of habitat for Austral Toadflax

4.2 IDENTIFY CANDIDATE SPECIES CREDIT SPECIES FOR FURTHER ASSESSMENT

Section 6.4.1.17 of the BAM provides the opportunity to consider whether a predicted candidate species is unlikely to occur within the development site where habitat is substantially degraded to a point that they would be unlikely to utilise or where an expert report identifies that the species is unlikely to be present. A predicted candidate species credit species that is not considered to have suitable habitat present, does not require further assessment. However, the reasons for making these determinations must be documented.

To inform this assessment of how habitat degradation has impacted candidate threatened species, a search of the Atlas of NSW Wildlife (OEH, 2019a) was carried out for a 10 kilometre radius around the study area (**Maps 5-8**). Using these existing records, the likelihood of occurrence was assessed using the following methods:

- Species occurrence within the study area and locality
- Condition and extent of available habitats
- Application of the knowledge and experience of the EnviroKey Principal Ecologist

Table 5 outlines the predicted candidate species (from the BAMC) and provides a justification for the decision by EnviroKey to either maintain or discard each species as a candidate species based on the presence of suitable habitat within the Study Area.

Table 5: Candidate species justification.

Common name	Habitat constraints / Geographic limitations	Response to BAMC	Maintained as candidate species
Striped Legless Lizard		Habitat highly degraded, no records in the locality. However, is known from exotic grasslands.	Yes
Pink-tailed Legless Lizard	Rocky areas or within 50 metres of rocky areas	No rocky areas exist within 50 metres of the proposed extraction area	No
Rough Eyebright	Montane bogs or within 50 metres	No montane bogs present. Proposed extraction site highly degraded. No	No
Southern Myotis	Bridges, caves or artificial structures within 200 metres of riparian zone. Hollow-bearing trees, Within 200 metres of riparian zone	Habitat surrounding features is highly degraded. No breeding habitat present	No
Large Bent-winged Bat (breeding habitat)	Caves, tunnels, mines, culverts or other structure known or suspected to be used	No such feature occurs within or adjacent to the proposed extraction area. Pre-maternity cave known meeting place (Mt Fairy) is about 13kms east.	No
Button Wrinklewort	-	Natural Temperate Grassland does not exist in the proposed extraction area. As confirmed by the VIS of 1.6/100, the site is highly degraded and the species is unlikely to occur and it is highly sensitive to grazing. Very low potential to occur.	Yes
Austral Toadflax	-	Proposed extraction area highly modified and degraded. No native grassland present in the context of habitat for Austral Toadflax	No

Based on the assessment of available habitat for predicted candidate species and the potential (albeit very minor) to occur within the study area, there are two species credit species of potential relevance to the BDAR. These being:

- Striped Legless Lizard
- Button Wrinklewort

Any confirmed candidate species would require field survey in accordance with the BAMC.

4.3 STATE ENVIRONMENTAL PLANNING POLICY

State Environmental Planning Policy (SEPP) No. 44 encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free-living populations will be maintained over their present range across 107 local government areas (LGA). Local councils listed under Schedule 1 of SEPP44 cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

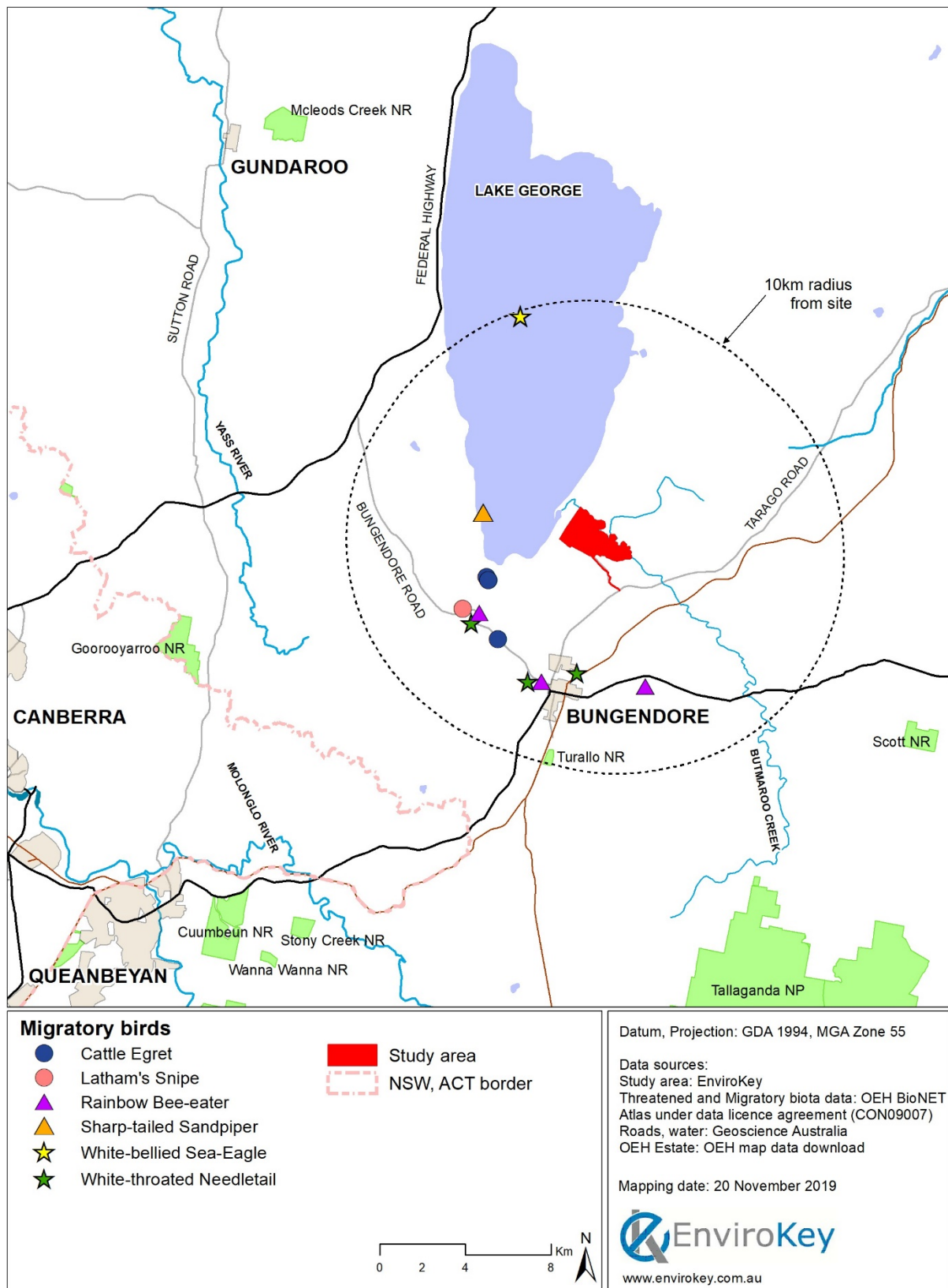
SEPP 44 aims to identify areas of *potential* and *core* Koala Habitat. These are described as follows:

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

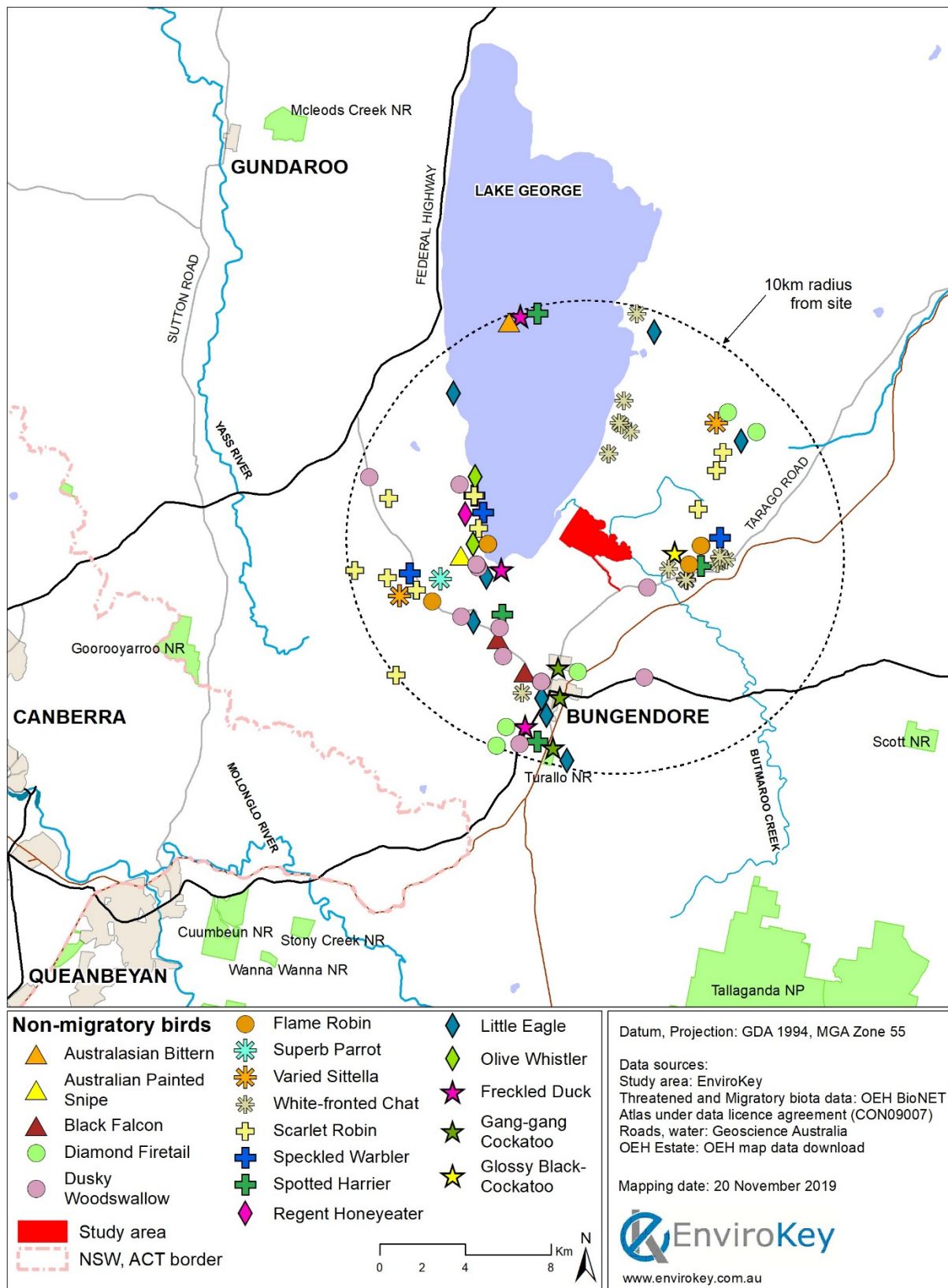
The former Yarrowlumla Local Government Area (LGA) is listed within Schedule 1 of SEPP 44 as land to which this planning instrument applies and in which the Project Site is located.

The Project Site cannot be considered Potential or Core Koala Habitat as listed by SEPP 44 as:

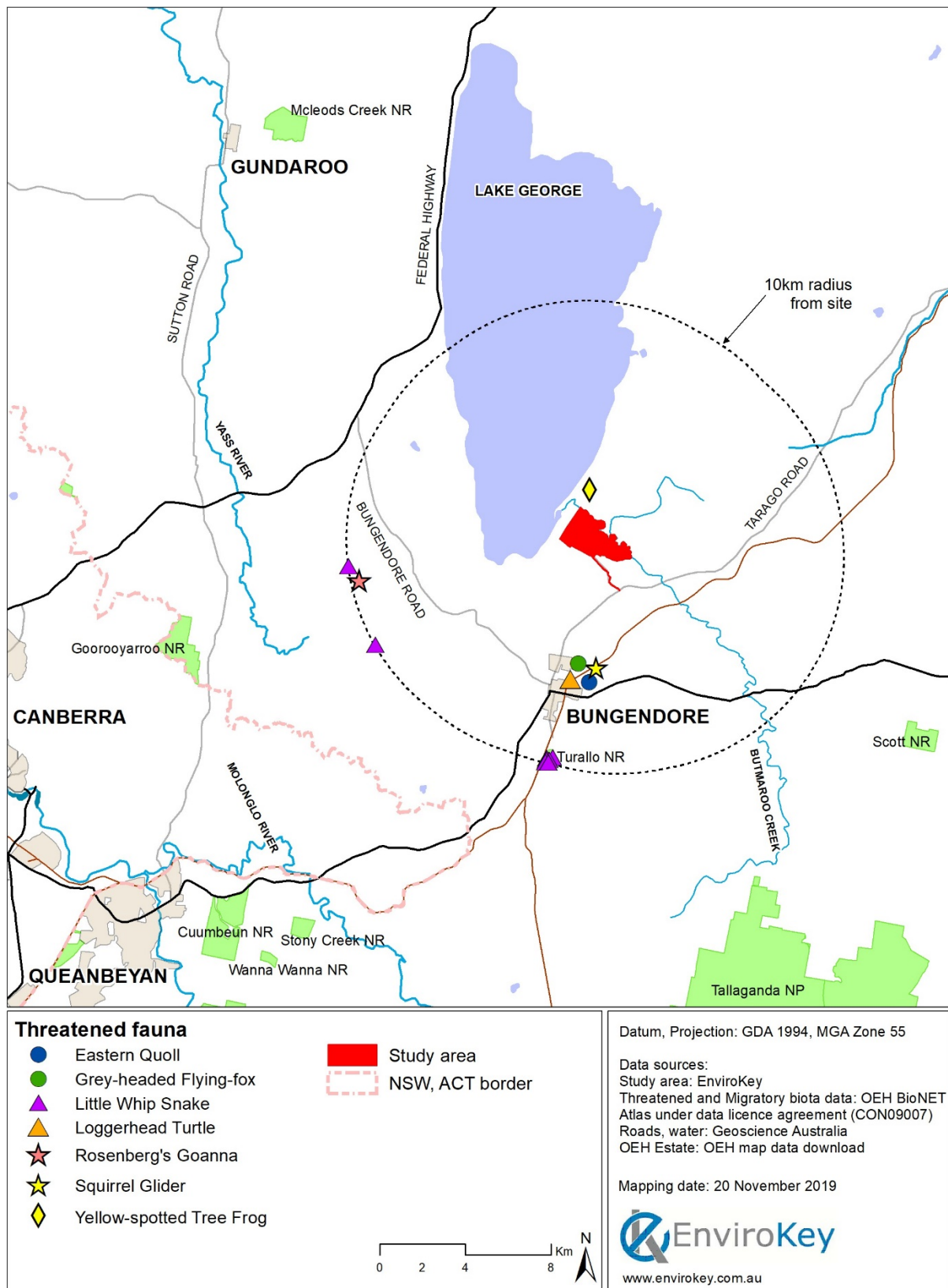
- It does not contain trees species listed within Schedule 2 being at least 15 percent of the total number of trees
- It does not contain a resident population of Koalas, or recent or historical records, due to lack of native overstorey species.



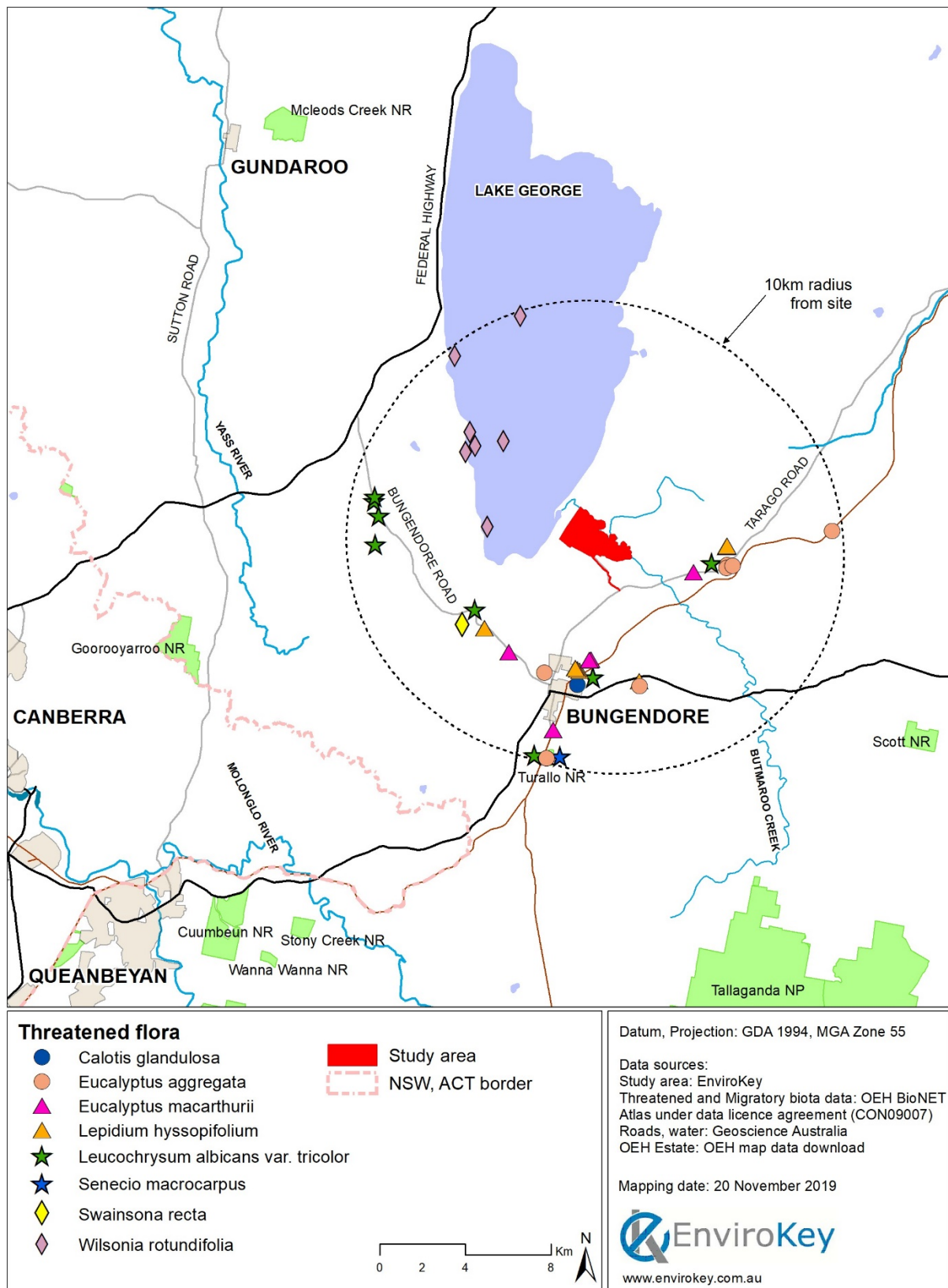
Map 5: Previous records of migratory birds in the locality



Map 6: Previous records of threatened birds in the locality



Map 7: Previous records of other threatened fauna in the locality



Map 8: Previous records of threatened flora species in the locality

4.4 DETERMINE PRESENCE OR ABSENCE OF A CANDIDATE SPECIES CREDIT SPECIES

Confirmed candidate species were assessed consistent with steps 4-6 of section 6.4 of BAM. The survey effort, timing and locations for threatened flora and fauna are outlined in the following sections.

4.4.1 *Target field surveys – flora*

During the vegetation survey on the 3-4 September 2019, targeted threatened flora transects were carried out by an experienced ecologist over the proposed extraction area. The objective of the field survey was to locate any individual Button Wrinklewort. The field survey occurred within a suitable timing period (September) as identified by the BAMC. Survey transects were carried out over 6 person hours and their locations are identified on **Map 4**.

Despite extensive surveys during an appropriate time of the year, but not surprising given the highly modified nature of the proposed extraction area, no Button Wrinklewort were recorded, and none are considered to occur there. Subsequently, their presence within the proposed extraction area was selected as 'no'.

4.4.2 *Target field surveys – Striped Legless Lizard*

Surveys were completed for Striped Legless Lizard, guided by the EPBC Act Survey Guidelines (SEWP&C, 2011), and the experience of the Principal Ecologist with herpetofauna. The proposed extraction area provides little in the way of potential habitat of this species, with the existing environment highly degraded and realistically, the species is unlikely to occur there. Nonetheless, two survey methods were employed to survey for the potential presence of this species.

Artificial shelter sites were employed at three locations within the proposed extraction area (**Figure 4-1**). These consisted of roof tiles placed in grids of 12 tiles by five tiles (60 tiles). Shelter sites were established three weeks prior to the first field survey, and while this is inside the recommended period within the guidelines, the author has detected Striped Legless Lizard within 14 days of establishment using roof tiles. Shelter sites were checked on four separate occasions on a weekly/fortnightly basis as recommended for spring surveys. Tiles were checked when ambient temperatures did not exceed 24 degrees Celsius.

Active searches were also employed around grass tussocks (Serrated Tussock), and while this method is not always successful, it is considered complimentary to the artificial shelter sites. Active searches were carried out in conjunction with the threatened flora transects. The locations of the tile grids are presented in **Map 9** and the search transects on **Map 4**.



Figure 4-1: One of the three tile grids within the proposed extraction area

4.4.3 Target field surveys – Birds

While no bird species were identified as candidate species, diurnal bird surveys were conducted using the widely accepted 'standardised method' (Watson, 2003).

Within the study area but predominantly within the proposed extraction area, ten 20 minute surveys were completed. Any species of bird observed or identified from call recognition, were recorded during the field survey period. Additionally any species observed outside of these survey periods were recorded as opportunistic observations. Surveys were completed across a range of environmental variables including morning and afternoon periods to encompass the range of avifaunal assemblages and their periods of activity. Locations of diurnal bird surveys are provided (**Map 9**),

4.4.4 Target field surveys – Frogs

While no frog species were identified as candidate species, a general frog survey was carried out at two locations within the study area.

Calls of Yellow-spotted Tree Frog (*Litoria castanea*) and Green and Golden Bell Frog (*Litoria aurea*) were broadcast to elicit a response. Calls were played for 2 minutes duration, then a

period of three minutes listening. Then the survey method was repeated. After this, an active search was carried out over 30 person-minutes. Each frog survey site was revisited during the day where active searches for active and basking frogs (as bell frogs often do). Tadpole surveys using dip nets were also completed at frog survey locations.

4.4.5 Target field surveys – Nocturnal survey

Nocturnal fauna survey consisted of call playback and a nocturnal transect (for spotlighting and echolocation call recording using an ANABAT SD1 detector unit). Call playback consisted of transmitting a pre-recorded call of an individual species (Barking Owl and Masked Owl), with a two minute listening period between each call. The call was transmitted using an iPhone connected via Bluetooth to a portable speaker. Spotlighting surveys were conducted by traversing the site looking for eye shine and any moving nocturnal fauna. A powerful head torch with spotlight capability was used for the duration of the survey.

Echolocation calls recorded during the field survey were identified using AnalookW software by visually comparing call traits with those within 'The Bat Calls of NSW: Region based guide to the echolocation calls of microchiropteran bats' (Pennay et al., 2004) 'Australian Bats 2nd Edition' (Churchill, 2008) and a reference call collection held by EnviroKey.

Nocturnal surveys were carried out over one hour by two persons during one night at two sites (four person hours total). The location of these surveys is provided in **Map 9**.

4.5 THREATENED SPECIES RECORDED

Two threatened species were detected during the field surveys. Both are ecosystem credit species; these being the Dusky Woodswallow and White-fronted Chat.

White-fronted Chat can be found across the southern half of Australia mostly within temperate and arid climates (Morcombe, 2004). In New South Wales they are mostly in the southern half of the state, occurring in damp open habitats along the coast, and near waterways in the western part of the state (Higgins et al., 2006). A single pair were recorded foraging directly adjacent to the northern boundary of the proposed extraction area. Given the similarities of the proposed extraction area to the area where the pair was recorded, it is likely that they would use these areas from time to time.

OEH (2019a) identify the following threats to this species:

- Reduction in habitat size and quality
- Human disturbances
- Habitat alteration from river modifications
- Predation from feral species including foxes and cats
- Mangrove encroachment and sea-level rise

The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in

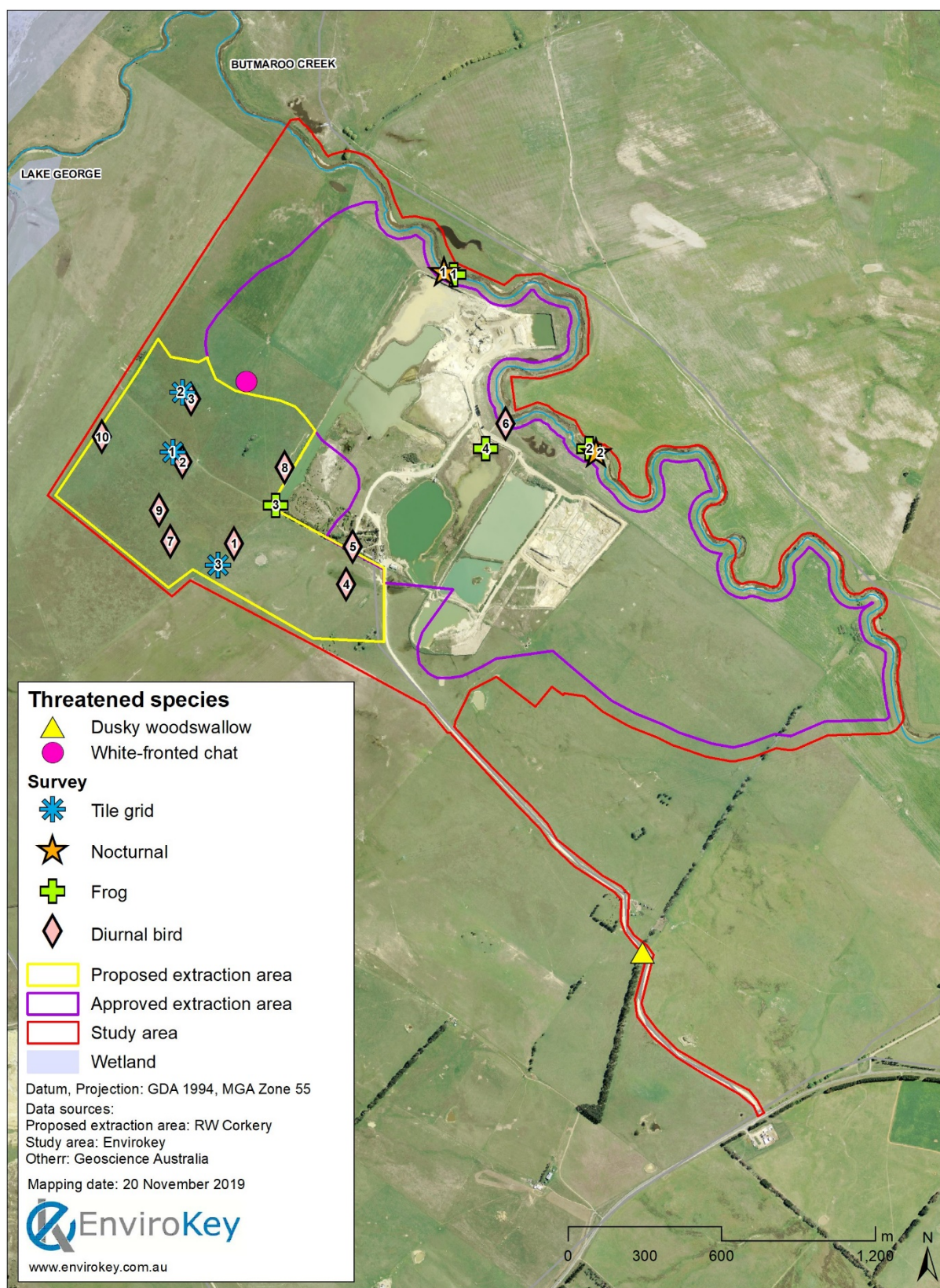
shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests (Higgins et al., 2006). They are also seen in areas of non-native vegetation. Dusky Woodswallow were recorded on numerous occasions within the Radiata Pine windbreak that crosses the existing access road. At least five individuals were recorded. None were recorded within the proposed extraction area.

The NSW Scientific Committee lists the following threats for Dusky Woodswallow:

- Past and ongoing reductions in habitat quality
- Competitive exclusion by Noisy Miners (*Manorina melanocephala*)
- Nest predation by Currawongs, Magpies and Grey Butcherbirds
- Inappropriate fire regimes, excessive grazing and removal of coarse woody debris from the ground layer.

As no nesting activity was noted during the field survey or within the proposed extraction area, and given that both species are ecosystem credit species, no further analysis is required.

Despite targeted field surveys at an appropriate time of the year, no Striped Legless Lizard or Button Wrinklewort were detected. The absence of both of these species is not surprising given the absence of local records for both species, and the highly modified and extensively and heavily grazed habitats of the study area.



Map 9: Locations of fauna surveys and threatened species detected during the field survey.

5 AVOIDING AND MINIMISE IMPACTS ON BIODIVERSITY VALUES

5.1 AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT DURING PROJECT PLANNING

Across the study area, native vegetation is significantly degraded by exotic pasture species and does not comprise an endangered or critically endangered ecological community, and regardless of the location of the proposed extraction area, impacts would be identical to vegetation and habitat. Given this, the proposed extraction area has been largely designed to avoid impacts to an area of Aboriginal heritage significance, namely the Wood Duck Potential Archaeological Deposit (PAD).

5.2 AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS DURING PROJECT PLANNING

5.2.1 *Impacts to threatened species and non-native vegetation*

Two threatened fauna species were recorded within the study area. These being White-fronted Chat (associated with highly degraded vegetation dominated by exotic flora) just north of the proposed extraction area, and Dusky Woodswallow (associated with non-native trees(conifers) along the existing access road. Both habitat types are not limiting within the study area, on adjacent land or in the general locality.

5.2.2 *Impacts to water quality and water bodies*

The proposed activity is not likely to impact Lake George (located about 1 kilometre west of the proposed extraction area) or Butmaroo Creek (which flanks the northern boundary of the study area, and at its closest point, is located about 800 metres north of the proposed extraction area) and flows into Lake George. Given these distances from the proposed extraction area, no impacts to water bodies are likely.

The existing quarry operations do not appear to be negatively impacting water quality. While no water quality testing was carried out, water quality was considered to be relatively good at the time of the field survey. No obvious odor or discoloration from petrochemical spills was observed or noted, however the water was slightly turbid. This is most likely from the extensive grazing activity noted in the catchment of the creek, not the existing quarry operations. Given this, it is unlikely the proposed extraction area, provided adequate safeguards are in place regarding sediment control, would impact water quality in the adjacent and nearby water bodies.

5.3 PALERANG LOCAL ENVIRONMENTAL PLAN 2014

The Palerang Local Environmental Plan (LEP) 2014 identifies that the proposed extraction area is zoned E3 Environmental Management and RU1 – Primary Production.

Extractive industries are permissible with consent within zone RU1. Industries are generally prohibited within zone E3, however, as agriculture is permitted with consent in this zone, under Part 2, Clause 7(3a) of the NSW State Environmental Planning Policy (Mining, Petroleum and Extractive Industries), 2007, the Quarry is permissible, with consent. The existing Quarry Access Road is located within land zoned RU1, with the development of roads permissible with consent within this zone.

An additional local provision within the LEP is Part 5, Clause 6.5, Terrestrial Biodiversity. This provision is relevant to the subject land. The objective of this clause is to maintain terrestrial biodiversity by:

- Protecting native flora and fauna
- Protecting the ecological processes necessary for their continued existence
- Encouraging the conservation and recovery of native flora and fauna and their habitats

Part 6.3 (3) of the LEP states that ‘before determining a development application for the development on land to which this clause applies, the consent authority must consider:

a) whether the development is likely to have:

- (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land
- (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna
- (iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land
- (iv) any adverse impact on the habitat elements providing connectivity on the land

b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

With consideration of 6.5 (3) (a), the proposed development would not have any adverse impacts on the matters listed in i to iv, as it:

- Is within an area of highly disturbed and modified vegetation confirmed by a very low vegetation integrity score (1.6/100)
- Would be carried out within an area of the land of least biodiversity value
- Would not affect any listed threatened ecological community
- Would not isolate or fragment other areas of habitats to the extent that wildlife connectivity would be affected
- Would not remove habitat that is of importance to the long-term viability of flora and fauna in the locality with consideration of the highly disturbed and modified nature of

the proposed extraction area and the remaining habitat that occurs across the locality that would remain unaffected by the proposal.

With consideration of 6.5 (3) (b), this BDAR (section 5) includes how impacts to biodiversity have been avoided and minimised through project planning and design. Section 6 of this BDAR includes appropriate measures to mitigate impacts to biodiversity while section 7 details the biodiversity offset required.

6 ASSESSING AND OFFSETTING IMPACTS

6.1 EPBC ACT REFERRAL

Given that the proposed extraction area is located within a highly modified and disturbed environment, the proposed activity is *unlikely* to have a ‘*significant effect*’ on any EPBC Act listed biota and their habitats or other matters of National Environmental Significance. On this basis, the proposed activity would not require referral to the Commonwealth Minister.

6.2 ASSESSMENT OF IMPACTS

6.2.1 *Assessing direct impact to native vegetation and habitat, threatened ecological communities and threatened species habitat*

Impacts to native vegetation (with a very low VIS of 1.6/100) are anticipated through the direct clearing of about 77 hectares. None of this vegetation is consistent with a BC Act or EPBC Act listed threatened ecological community. The direct clearing and subsequent development of the proposed extraction area would represent a permanent impact, or loss, of this vegetation and habitat. At the end of life of the proposed extraction area, the site would be subject to the creation of artificial wetlands as detailed in a *Quarry Development and Rehabilitation Plan*.

Given that the proposed extraction area is located within a highly modified and disturbed environment with a VIS of 1.6/100, there will be no requirement for offsets as it is well below the offset threshold.

6.2.2 *Assessing indirect impact to native vegetation and habitat, threatened ecological communities and threatened species habitat*

It is difficult to quantify indirect impacts associated with many projects, but in this instance, these may include impacts such as noise, and erosion and sediment control.

Given that the proposed extraction area is located directly adjacent to an existing Quarry operation and within a highly modified environment, it is unlikely that the proposed activity would have an adverse impact on adjacent areas of vegetation and habitat. It is also unlikely that the proposed activity would reduce the viability of any adjacent vegetation or habitat as a result from edge effects, noise, or dust.

6.3 ASSESSING PRESCRIBED BIODIVERSITY IMPACTS

As described in section 2.1.3, no prescribed biodiversity impacts are likely from the proposed activity.

6.4 MITIGATING AND MANAGING IMPACTS ON BIODIVERSITY VALUES

As demonstrated within this BDAR, the proposed activity has been located within a highly modified environment, avoiding impacts to biodiversity values. The vegetation that would be removed should the proposed activity proceed, is of extremely low condition (VIS 1.6/100) and impacts to this are not considered to affect any biodiversity value. Regardless, a range of measures are included within the BDAR to reduce impacts where possible.

6.4.1 *Erosion and Sediment Control Plan*

To avoid potential indirect impacts to adjacent areas of vegetation and habitat, an appropriate Erosion and Sediment Control Plan (ESCP) would be prepared. This should follow best practice protocols and should be in place prior to any works commencing.

6.4.2 *Rehabilitation*

At the end of life of the proposed extraction area, it is proposed that the site would be subject to the creation of artificial wetlands as detailed in a *Quarry Development and Rehabilitation Plan*. The artificial wetlands should consider the following components in their design:

- Wetlands should have a deep and shallow end. The shallow extreme should be about 10-15 cm in depth and the deep end, no greater than 1.8 m.
- Should trees be planted around the wetland, they should only be planted on the southern and western sides, to ensure that the water body is shade free.
- The incorporation of grassy areas adjacent to the wetland.
- The placement of rocks on the edge of the wetland (ranging in sizes from 100mm to 1m).
- Plantings of sedges, rushes and grasses.

6.5 ADAPTIVE MANAGEMENT FOR UNCERTAIN IMPACTS

Excluding the need for an ESCP and a Rehabilitation Plan, no additional adaptive management measures are proposed.

6.6 THRESHOLDS FOR THE ASSESMENT AND OFFSETTING OF IMPACTS OF DEVELOPMENT

6.6.1 *Serious and Irreversible impacts (SAIL)*

PCT 896 Kangaroo Grass – Wallaby Grass – Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion has not been identified as an SAIL entity in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE, 2019) or within the BioNET database as an entity at risk of a SAIL.

6.6.2 *Impacts that do require an offset*

Impacts associated with any PCT generally require an offset under the BAM with the exception of any area mapped as non-native vegetation including exotic grassland or planted non-indigenous vegetation. Section 10.3.1 of the BAM describes where impacts on native vegetation (ecosystem credits) require offsetting.

For this BDAR and in accordance with section 10.3.1 of the BAM, as the VIS is below 17 and the PCT is associated with threatened species habitat (as represented by ecosystem credits), an offset is not required.

7 FINAL CREDIT CALCULATIONS

7.1 CREDIT CALCULATIONS AND CLASSES

7.1.1 *Ecosystem credits*

Based on the preliminary footprint, and as described in section 6.4.2 of this BDAR, the VIS is below 17. In accordance with section 10.3.1 of the BAM, if the VIS is below 17, an offset is not required.

7.1.2 *Species credits*

No species credit species are relevant to the proposed extraction area (as outlined in section 4 of this BDAR).

7.2 CREDIT COSTS

As no ecosystem credits or species credits are required for the proposed activity, there are no credit costs of relevance. BAMC reports are included within **Appendix 6**.

8 REFERENCES

- CHURCHILL, S. 2008. Australian Bats. *Reed New Holland, Frenchs Forest, Australia*.
- DPI 2013. Policy and guidelines for fish habitat conservation and management.
http://www.dpi.nsw.gov.au/data/assets/pdf_file/0009/468927/Policy-and-guidelines-for-fish-habitat.pdf.
- DPIE 2019. Guidance to assist a decision-maker to determine a serious and irreversible impact. <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf>.
- GBA 2008. Flora and Fauna Report, Lot 32, Grantham Park, Tarago Road. *A letter report prepared by Geoff Butler and Associates for Don Fox Planning*.
- HIGGINS, P. J., PETER, J. & COWLING, S. 2006. *Handbook of Australian, New Zealand and Antarctic Birds (vol 7)*. Melbourne, Oxford University Press.
- MITCHELL, P. B. 2002. Descriptions for NSW Mitchell Landscapes. *A report prepared for the NSW National Parks and Wildlife Service, Hurstville, NSW*.
- MORCOMBE, M. 2004. *Field guide to Australian Birds*, Archerfield, Queensland, Steve Parish Publishing.
- NPWS 2003. The Bioregions of New South Wales: their biodiversity, conservation and history. *NSW National Parks and Wildlife Service, Hurstville*.
- OEH 2017. Biodiversity Assessment Method. *Office of Environment & Heritage for the NSW Government*,
- OEH. 2019a. *BioNET: The website for the Atlas of NSW Wildlife: A whole-of-government system for flora and fauna sightings information* [Online].
- OEH 2019b. NSW Vegetation Information System: Classification.
<http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>.
- PENNAY, M., LAW, B. & REINHOLD, L. 2004. Bat calls of NSW: A region based guide to echolocation calls of microchiropteran bats. *NSW Department of Environment & Conservation, Hurstville, NSW*.
- SEWP&C 2011. Survey guidelines for Australia's threatened reptiles. *Commonwealth of Australia*.
- THACKWAY, R. & CRESWELL, I. D. 1995. An interim biogeographic regionalisation for Australia: a framework for establishing the national system of reserves. Version 4.0. *Australian Nature Conservation Agency, Canberra*.
- WATSON, D. M. 2003. The 'standardized search' : An improved way to conduct bird surveys. *Austral Ecology*, 28, 515:525.

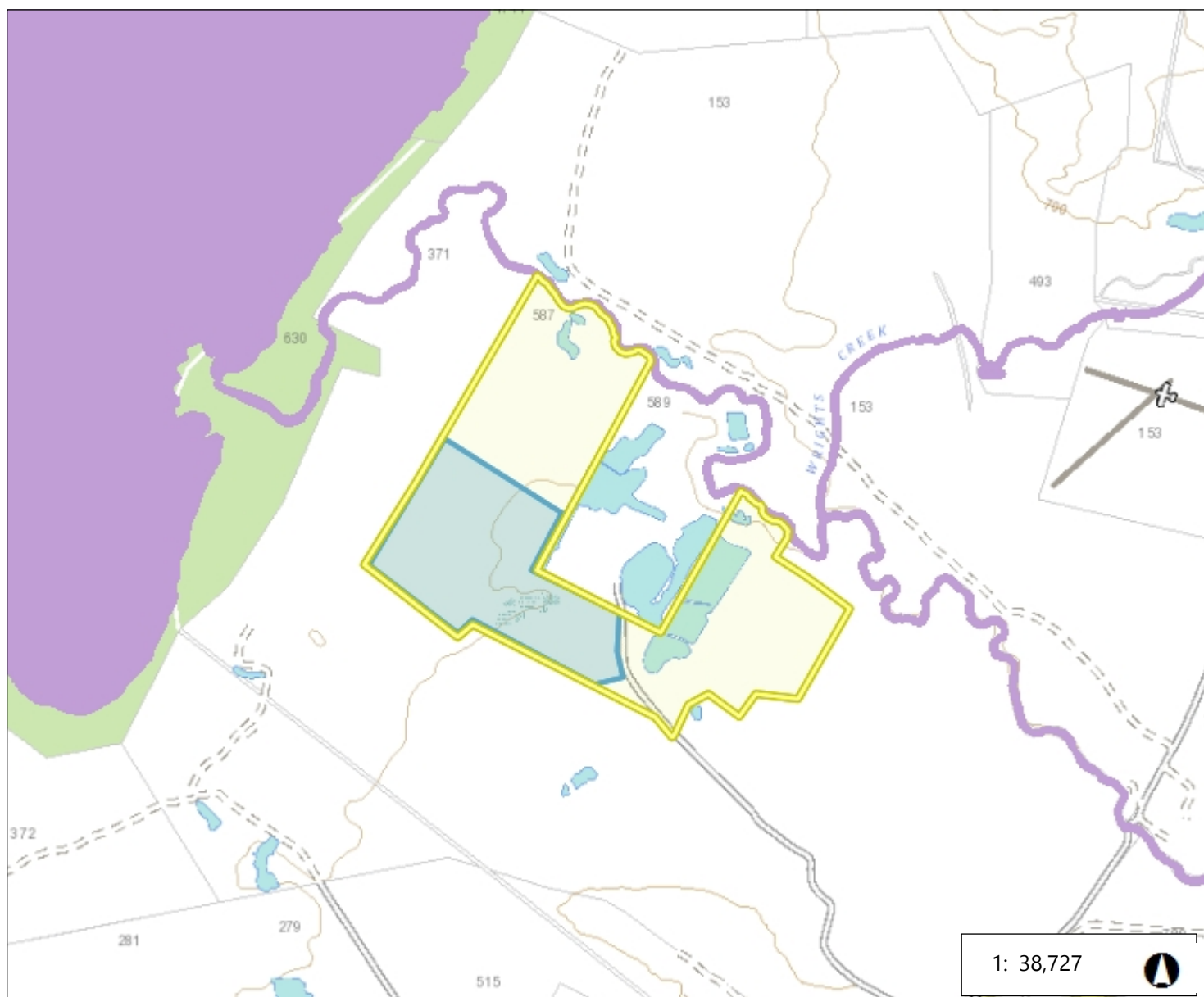
9 APPENDICES

APPENDIX 1 – QUALIFICATIONS AND EXPERIENCE OF PERSONNEL

Name and Qualifications	Experience
Steve Sass B.App.Sci (Env.Sci) (Hons), GradCert.CaptVertMngt (CSU) Director / Principal Ecologist NSW Biodiversity Accredited Assessor (BAAS17047) Certified Environmental Practitioner, EIANZ Member, Ecological Consultants Association of NSW	Steve is a highly experienced Ecologist having undertaken hundreds of terrestrial and aquatic ecological surveys and assessments across Australia since 1992. He has an in-depth working knowledge of environmental and biodiversity legislation across all states and territories which allows him to provide detailed and accurate assessments and formulate practical solutions to clients and specific projects on a case-by-case basis. He is a current NSW Biodiversity Accredited Assessor (BAAS17047) by the NSW Office of Environment and Heritage. Steve is a past Councillor of the Ecological Consultants Association of NSW. Steve was appointed 'Expert' status for a number of threatened species listed under the <i>Biodiversity Conservation Act 2016</i>. Previous and current research holds Steve in high regard within both the scientific and ecological consultants' community. To date, Steve has published, submitted or has in preparation, thirty-three manuscripts within peer-reviewed journals, many of which are related to threatened species survey, monitoring or management. Steve has extensive experience in NSW. Over the past 15 years, he has completed or provided specialist biodiversity advice to more than 1000 environmental assessments for projects such as residential and industrial developments, highway upgrades and telecommunications, water, sewerage, energy, mining and electricity network infrastructure projects. Steve was the senior author of this report and all BAM calculations. Steve lead the field surveys including BAM plot/transects, bird surveys, creek assessment and tile grid surveys.
Mark Harris B.App.Sci (Env Res Mgt) Senior Botanist / GIS Analyst	Mark is a highly experienced botanist having undertaken flora surveys across eastern and central Australia and he has more than 12 years' experience in Biodiversity Assessment and Planning. With Steve, he completed the BAM plot/transects and threatened flora surveys. Mark also completed the mapping and spatial analysis.
Harrison Warne B. Sc (Zoology and Ecology) Ecologist	Harrison is a highly experienced ecologist despite graduating from James Cook University in 2017. He has extensive field identification skills in reptiles, frogs, mammals and birds. He has completed numerous fauna surveys on major projects including the Nyngan Scandium Project, Thackaringa Cobalt Project and the Bowdens Silver Project. For this project, Harrison assisted with the fauna surveys including the tile surveys.

APPENDIX 2 – BIODIVERSITY OFFSET SCHEMENT ENTRY LEVEL THRESHOLD TEST

Biodiversity Offset Scheme (BOS) Entry Threshold Map



1: 38,727



1,967.3 0 983.65 1,967.3 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

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Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	02/10/2019 9:37 PM	BDAR Required*
Total Digitised Area	76.66 ha	
Minimum Lot Size Method	LEP	
Minimum Lot Size	80 ha	
Area Clearing Threshold	1 ha	
Area clearing trigger Area of native vegetation cleared	Unknown [#]	Unknown [#]
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to <https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor> to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is "likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies with all aspects of the *Biodiversity Conservation Act 2016*.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature _____ Date: 02/10/2019 09:37 PM

APPENDIX 3 – BAM RAW FIELD DATA SHEETS

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
3.9.2019		Grantham Pk.		1		MH.	
Zone	Datum	IBRA region	Photo #		Zone ID		
55			ipad				
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
		20 x 50.					
Vegetation Class						Confidence:	
						H M L	
Plant Community Type		? 896 modified				EEC: ?	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)	# Tree Stems Count	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately
dbh	Euc*	Non Euc
large trees for Euc* & Non Euc	80 + cm	
	50 – 79 cm	
	30 – 49 cm	
	20 – 29 cm	
	10 – 19 cm	
	5 – 9 cm	n/a
	< 5 cm	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 10 3 2 20	50 30 60 50 5	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	9	40	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	Phalaris etc.
Soil erosion	1	R	stock tracks + general soil disturb by stock.
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	Sheep, cattle
Fire damage			
Storm damage			
Weediness	3	R	Serat tus, exot grasses etc
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham PK	1	MH

Plot Identifier

Recorders

Date _____

3.9.2019

Grantham PK

1

MH

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
3.9.2019		Grantham PK		2		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
			ipad				
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class						Confidence:	
Plant Community Type						Confidence:	
896? Modified						EEC: ?	
						H M L	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
 Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)	
dbh	Euc*	Non Euc	Hollows†		
large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm				n/a
	< 5 cm				n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)					total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	5	1	1	15	15	60	30	40	15	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	54																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	As prev.
Soil erosion	1	R	" "
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	" "
Fire damage			
Storm damage			
Weediness	3	R	" "
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.2019	Grantham Plk	2	MH

[illegible]

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
3.9.19		Grantham Pk		3		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
			ipad				
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class						Confidence:	
Plant Community Type						EEC:	
896 - modified.						H M L	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			
	50 – 79 cm			
	30 – 49 cm			
	20 – 29 cm			
	10 – 19 cm			
	5 – 9 cm		n/a	
	< 5 cm		n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)				

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30 ... 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	10	3	5	5	20	15	30	40	30	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	7					27					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	As prev.
Soil erosion	1	R	"
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	"
Fire damage			
Storm damage			
Weediness	3	R	"
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham Pk	3	MH, SS

Plot Identifier

Recorders

Date _____

3.9.19

Grantham Pk

3

MH 55

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
3.9.19		Grantham Pk		4		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class						Confidence:	
Plant Community Type						Confidence:	
896?						EEC: ?	
						H M L	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Count of Native Richness	
Sum of Cover of native vascular plants by growth form group	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			
	50 – 79 cm			
	30 – 49 cm			
	20 – 29 cm			
	10 – 19 cm			
	5 – 9 cm		n/a	
	< 5 cm		n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)				

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	10	10	3	15	3	5	10	5	0	0	0	0	0	0	0	0	0		
Average of the 5 subplots	12					5					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	As prev.
Soil erosion	1	R	
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	
Fire damage			
Storm damage			
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	3.9.19	Grantham PK	4	MH SS

[illegible]

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/19		Grandham Plk		5		MH	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						EEC:	
(896?) - Modified.						Confidence:	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.

Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			* includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> † Record total number of stems by size class with hollows (including dead stems/trees)
	50 – 79 cm			
	30 – 49 cm			
	20 – 29 cm			
	10 – 19 cm			
	5 – 9 cm		n/a	
	< 5 cm		n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)				total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30 ..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	2	10	5	3	5	30	5	40	20	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	5					23					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	
Soil erosion	1	R	As "prev
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	"
Fire damage			
Storm damage			
Weediness	3	R	"
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	4/9/19	Grandham Pk	5	MH

Plot Identifier

Recorders

Date _____

4/9/19

Grantham Pk

5

Mit

[illegible]

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/19		Grantham Pk		6		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class							Confidence:
Plant Community Type		896 - Modified					Confidence:
		EEC:					H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.

Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> † Record total number of stems by size class with hollows (including dead stems/trees)	
dbh	Euc*	Non Euc	Hollows†		
large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm				n/a
	< 5 cm				n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)					total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30, 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)			Bare ground cover (%)			Cryptogam cover (%)			Rock cover (%)								
Subplot score (% in each)	20	15	20	5	15	20	10	15	10	15	0	0	0	0	0	0	0	0
Average of the 5 subplots	15			14			0			0								

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	
Soil erosion	1	R	
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	
Fire damage			
Storm damage			
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _

Survey Name

Plot Identifier

Recorders

Date: _____

4/9/19

Grantham Pk.

6

M+H

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/19		Grantham PK		7		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class							Confidence:
Plant Community Type		896 Modified					Confidence:
		EEC:					H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.

Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)	
dbh	Euc*	Non Euc	Hollows†		
large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm				n/a
	< 5 cm				n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)					total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30 ... 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	25	10	20	10	10	5	15	30	15	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	15					17					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	"
Soil erosion	1	R	AS prev.
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	"
Fire damage			
Storm damage			
Weediness	3	R	"
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _

Survey Name

Plot Identifier

Recorders

Date _____

41919

Grantham PK

7

MH

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/19		Grantham PK		8		MH	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class						Confidence: H M L	
Plant Community Type		896 Modified				EEC: Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			
	50 – 79 cm			
30 – 49 cm				
20 – 29 cm				
10 – 19 cm				
5 – 9 cm			n/a	
< 5 cm			n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total	

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30, 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 20 10 10 15	3 15 5 3 2		
Average of the 5 subplots	13	6		

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	"
Soil erosion	1	R	As prev.
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	"
Fire damage			
Storm damage			
Weediness	3	R	"
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _

Survey Name

Plot Identifier

Recorders

Date _____

419119

Grantham PK

8

MH

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/19		Grantham Rk. Creek (a)		MH.			
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class		Creek spp list.				Confidence: H M L	
Plant Community Type		Cleared land-exotic				EEC: No Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth form group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia † Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			
	50 – 79 cm			
	30 – 49 cm			
	20 – 29 cm			
	10 – 19 cm			
	5 – 9 cm		n/a	
	< 5 cm		n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)				

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30 ..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	10	2	10	5	10	20	10	40	10										
Average of the 5 subplots	6					18														

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)	3	R	
Soil erosion	3	R	- severe bank erosion + deeply channelised.
Firewood / CWD removal			
Grazing (identify native/stock)	3	R	
Fire damage			
Storm damage			
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	4/9/2019	Grantham PK	Creek (9)	M.H.

Plot Identifier

Recorders

Date _____

4/9/2019

Grantham Plk

Creek (9)

MH

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
4/9/2019		Grantham Pk		Tree Planting (10)		MH	
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0 m point.			
Vegetation Class							Confidence:
							H M L
Plant Community Type							Confidence:
Tree Planting - rehab near office							H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth form group	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately * includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> † Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†	
large trees for Euc* & Non Euc	80 + cm			
	50 – 79 cm			
30 – 49 cm				
20 – 29 cm				
10 – 19 cm				
5 – 9 cm			n/a	
< 5 cm			n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)				

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30 ... 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)				
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	3	0	Was mined, now rehab tree planting.
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet of

Survey Name

Plot Identifier

Recorders

Date _____

4 / 9 / 2019

Grantham Pl

Tree Planting
(10)

24.

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

APPENDIX 4 – FLORA RECORDED WITHIN THE STUDY AREA

Scientific Name	Common Name
NATIVE	
<i>Austrostipa</i> sp.	A Speargrass
<i>Chloris truncata</i>	Windmill Grass
<i>Cynodon dactylon</i>	Common Couch
<i>Juncus</i> sp.	A Rush
<i>Schoenus apogon</i>	Common Bog-rush
<i>Typha orientalis</i>	Broadleaf Cumbungi
EXOTIC	
<i>Acetosella vulgaris</i>	Sheep Sorrel
<i>Bromus catharticus</i>	Praire Grass
<i>Capsella bursa-pastoris</i>	Shepherd's Purse
<i>Carthamus lanatus</i>	Saffron Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cyperus eragrostis</i>	Umbrella Sedge
<i>Dactylis glomerata</i>	Cocksfoot
<i>Datura stramonium</i>	Common Thornapple
<i>Echium plantagineum</i>	Patterson's Curse
<i>Eleusine tristachya</i>	Goose Grass
<i>Eragrostis curvula</i>	African Lovegrass
<i>Erodium cicutarium</i>	Common Crowfoot
<i>Hirschfeldia incana</i>	Hairy Brassica
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hypochaeris radicata</i>	Catsear
<i>Lepidium africanum</i>	Common Peppercross
<i>Lycium ferocissimum</i>	African Boxthorn
<i>Medicago</i> sp.	A Medic
<i>Nassella trichotoma</i>	Serrated Tussock
<i>Onopordum illyricum</i>	Illyrian Thistle
<i>Phalaris aquatica</i>	Phalaris
<i>Pinus radiata</i>	Radiata Pine
<i>Plantago lanceolata</i>	Lamb's Tongues
<i>Poaceae</i> exotic 1	Grass 1 (non-native)

Scientific Name	Common Name
<i>Poaceae exotic 2</i>	Grass 2 (non-native)
<i>Trifolium sp.</i>	A Clover

APPENDIX 5 – FAUNA RECORDED WITHIN THE STUDY AREA

Taxa	Scientific Name	Common Name
Amphibia	<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog
Amphibia	<i>Crinia signifera</i>	Clicking Froglet
Amphibia	<i>Litoria verreauxii</i>	Whistling Tree Frog
Amphibia	<i>Litoria peronii</i>	Emerald-spotted Tree Frog
Amphibia	<i>Uperoleia laevisgata</i>	Smooth Gungan
Aves	<i>Corvus coronoides</i>	Australian Raven
Aves	<i>Alauda arvensis</i>	Eurasian Skylark
Aves	<i>Artamus cyanopterus</i>	Dusky Woodswallow
Aves	<i>Cracticus tibicen</i>	Australian Magpie
Aves	<i>Epthianura albifrons</i>	White-fronted Chat
Aves	<i>Aquila audax</i>	Wedge-tailed Eagle
Aves	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark
Aves	<i>Hirundo neoxena</i>	Welcome Swallow
Aves	<i>Malurus cyaneus</i>	Superb Fairy-wren
Aves	<i>Fulica atra</i>	Eurasian Coot
Aves	<i>Falco cenchroides</i>	Nankeen Kestrel
Aves	<i>Anthus novaeseelandiae</i>	Australasian Pipit
Aves	<i>Sturnus vulgaris</i>	Common Starling
Aves	<i>Eolophus roseicapillus</i>	Galah
Aves	<i>Vanellus miles</i>	Masked Lapwing
Aves	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
Aves	<i>Cisticola exilis</i>	Golden-headed Cisticola
Aves	<i>Elseyornis melanops</i>	Black-fronted Dotterel
Aves	<i>Himantopus himantopus</i>	Black-winged Stilt
Aves	<i>Porphyrio porphyrio</i>	Purple Swamphen
Aves	<i>Anas superciliosa</i>	Pacific Black Duck
Aves	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet
Aves	<i>Ocyphaps lophotes</i>	Crested Pigeon
Aves	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Aves	<i>Anthochaera carunculata</i>	Red Wattlebird
Aves	<i>Strepera graculina</i>	Pied Currawong

Taxa	Scientific Name	Common Name
Aves	<i>Sericornis frontalis</i>	White-browed Scrubwren
Aves	<i>Passer domesticus</i>	House Sparrow
Aves	<i>Rhipidura leucophrys</i>	Willie Wagtail
Aves	<i>Falco berigora</i>	Brown Falcon
Aves	<i>Psephotus haematonotus</i>	Red-rumped Parrot
Aves	<i>Cincloramphus cruralis</i>	Brown Songlark
Aves	<i>Tadorna tadornoides</i>	Australian Shelduck
Aves	<i>Pelecanus conspicillatus</i>	Australian Pelican
Aves	<i>Phalacrocorax varius</i>	Pied Cormorant
Aves	<i>Biziura lobata</i>	Musk Duck
Aves	<i>Acanthiza nana</i>	Yellow Thornbill
Aves	<i>Carduelis carduelis</i>	European Goldfinch
Mammalia	<i>Vulpes vulpes</i>	Fox
Mammalia	<i>Oryctolagus cuniculus</i>	Rabbit
Mammalia	<i>Lepus capensis</i>	Brown Hare
Mammalia	<i>Vombatus ursinus</i>	Common Wombat
Mammalia	<i>Macropus giganteus</i>	Eastern Grey Kangaroo
Reptilia	<i>Tiliqua scincoides</i>	Common Blue-tongued Skink
Reptilia	<i>Pseudemoia pagenstecheri</i>	Tussock Skink
Reptilia	<i>Hemiergis talbingoensis</i>	Eastern Three-toed Earless Skink

APPENDIX 6 – BAM CACULATOR REPORTS

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00017795/BAAS17047/19/00017796	61	0	17/03/2020
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		Grantham Park Sand Quarry Extension	Open
	Assessment Type	Date Finalised	
	Part 4 Developments (General)	To be finalised	

PCT list

Price calculated	PCT common name	Credits
Yes	896 - Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	0

Species list

Price calculated	Species	Credits
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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Monaro	896 - Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion Warning: This PCT has NO trades recorded	No		19.99%	\$20.00	1.0000	\$2,178.86	0	\$0.00

Subtotal (excl. GST) **\$0.00**

GST **\$0.00**

Total ecosystem credits (incl. GST) \$0.00

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
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No species available

Biodiversity payment summary report

Grand total Contact BCT for
pricing



BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Assessor Number	BAM Data version *
		15
Proponent Name(s)	Report Created	BAM Case Status
	17/03/2020	Open
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Variations)

Predicted Threatened Species Not On Site

Name
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Dasyurus maculatus / Spotted-tailed Quoll
Melanodryas cucullata cucullata / Hooded Robin (south-eastern form)
Chthonicola sagittata / Speckled Warbler

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	Not a TEC	76.4	0.00
896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	Like-for-like credit retirement options		
	Class	Trading group	HBT IBRA region

BAM Biodiversity Credit Report (Variations)

	Temperate Montane Grasslands This includes PCT's: 894, 895, 896, 1110, 1288, 1298	Temperate Montane Grasslands - ≥ 90% cleared group (including Tier 2 or higher).	No	Monaro, Bungonia, Crookwell, Kybayan- Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Grasslands	Tier 2 or higher	No	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Assessor Number	BAM Data version *
		15
Proponent Names	Report Created	BAM Case Status
	17/03/2020	Open
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	To be finalised

Potential Serious and Irreversible Impacts

Nil

Nil

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Like for like)

Predicted Threatened Species Not On Site

Name
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Dasyurus maculatus / Spotted-tailed Quoll
Melanodryas cucullata cucullata / Hooded Robin (south-eastern form)
Chthonicola sagittata / Speckled Warbler

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	Not a TEC	76.4	0.00

896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	Like-for-like credit retirement options			
	Class	Trading group	HBT	IBRA region



BAM Biodiversity Credit Report (Like for like)

	Temperate Montane Grasslands This includes PCT's: 894, 895, 896, 1110, 1288, 1298	Temperate Montane Grasslands - $\geq$ 90% cleared group (including Tier 2 or higher).	No	Monaro, Bungonia, Crookwell, Kybeyan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Report Created	BAM Data version *
	17/03/2020	15
Assessor Number	Assessment Type	BAM Case Status
	Part 4 Developments (General)	Open
* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.		Date Finalised
		To be finalised
	Assessment Revision	
	0	

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	896_Low	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion	Low	76.37	5	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Report Created	BAM Data version *
	17/03/2020	15
Assessor Number	Assessment Type	BAM Case Status
	Part 4 Developments (General)	Open
	Assessment Revision	Date Finalised
	0	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Dusky Woodswallow	Artamus cyanopterus cyanopterus	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Flame Robin	Petroica phoenicea	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Scarlet Robin	Petroica boodang	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion

Threatened species not within the area of these PCT's

BAM Predicted Species Report

Common Name	Scientific Name	Vegetation Types(s)
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Speckled Warbler	<i>Chthonicola sagittata</i>	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	896-Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Report Created	BAM Data version *
	17/03/2020	15
Assessor Number	Assessment Type	BAM Case Status
	Part 4 Developments (General)	Open
	Assessment Revision	Date Finalised
	0	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
<i>Delma impar</i> Striped Legless Lizard	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
<i>Rutidosia leptorrhynchoides</i> Button Wrinklewort	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard
<i>Euphrasia scabra</i> Rough Eyebright
<i>Myotis macropus</i> Southern Myotis
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat
<i>Thesium australe</i> Austral Toadflax

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00017795/BAAS17047/19/00017796	Grantham Park Sand Quarry Extension	27/09/2019
Assessor Name	Report Created	BAM Data version *
	17/03/2020	15
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
0	Part 4 Developments (General)	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
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BAM Credit Summary Report

Kangaroo Grass - Wallaby Grass - Snow Grass moist tussock grassland in the Monaro and the Southern Tablelands regions of the South Eastern Highlands Bioregion and NSW South Western Slopes Bioregion

1	896_Low	0.1	76.4	0.25	High Sensitivity to Potential Gain	2.50		0
							Subtotal	0
							Total	0

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAI	Species credits
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