Ecological Assessment Report

for the

proposed installation of a Battery Energy Storage System (BESS)

at

Lot 51 DP 776564

(No. 981) New England Highway,

ABERDEEN

NSW

Prepared by: WILDTHING Environmental Consultants

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For:

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Job No: 12831

November 2023

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Project Name	Ecological Assessment Report for the installation of a Battery Energy Storage System (BESS). Lot 51 DP 776564 (No. 981) New England Highway,	
Project Number	12831	
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Date	7 December 2023	
Version Number	1	

Disclaimer

This report has been prepared in accordance with the proposal provided by the Client and outlined within this report. All findings, conclusions or recommendations contained within this report are based upon the data and results collected under the times and conditions specified in the report and are only applicable for the proposal considered within this report. This report has been prepared for use exclusively by the Client. No responsibility for its use by any other party is accepted by WILDTHING Environmental Consultants.

Summary

Flora, fauna and habitat studies have been undertaken for the proposed installation of a Battery Energy Storage System (BESS) and associated infrastructure such as an access road and 11kv cable at 981 New England Highway, Aberdeen NSW. The subject land consisted of Lot 51 DP 776564 (No. 981) New England Highway, Aberdeen NSW. The irregular shaped 37.1ha lot was bounded by the New England Highway in the southeast, the Hunter River in the west, Public Recreation land, a Sewage Treatment Plant and General Residential development in the north and large rural lots to the west, east and south. The subject land is zoned as RU1 - Primary Production and is located in Muswellbrook Shire Council LGA. The study area included the established road access off the New England Highway in the east of the subject land, the proposed access road to the three proposed Battery Energy Storage Systems (BESS) footprint, the footprint of all proposed BESS, APZ and the proposed cable route.

The entire subject land had been subject to historic native vegetation clearance and ongoing cattle grazing and cropping. Areas of native vegetation in the form of scattered and clumped remnant native trees and associated derived grassland were present in the far east and in the far west a narrow strip of riparian vegetation was present along the Hunter River.

Native vegetation within proximity to the BESS Sites was reduced to scattered and clumped remnant trees. Ironbark) and *Eucalyptus moluccana* (Grey Box). Other canopy species present were *Eucalyptus melliodora* (Yellow Box) and *Eucalyptus blakelyi* (Blakely's Red Gum). No canopy species were present within or in close proximity to BESS Site 1. A number of specimens of *Eucalyptus crebra* (Narrow-leaved Ironbark) and to a lesser extent *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus melliodora* (Yellow Box) were present in close proximity to BESS Site 2 & 3 which were also mostly composed of derived grassland. The mid and shrub layer was absent from all BESS sites. An exception was a couple of specimens of *Maireana microphylla* (Small-leaf Bluebush) within the vicinity of BESS Site 1. The derived ground layer was maintained low by cattle grazing and was composed of a mixture of native and introduced grasses and herbs.

The vegetation within the site was stratified and areas of native vegetation was assigned a vegetation to Plant Community Types (PCTs) detailed in the NSW Vegetation Information System (VIS) classification database. Vegetation within all three Battery Sites was difficult to assign a single PCT and was considered to be a combination of two PCT's, PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland. Due to the dominance of *E. crebra* it was considered that PCT 3431 was present.

PCT 3431 Central Hunter Ironbark Grassy Woodland within the subject areas was found to be consistent with the listed NSW BC Act 2016 Endangered Ecological Community (EEC) Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions. As a result of the proposal, approximately 0.76ha Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions. At least one canopy tree (Tree No. 12) will be required to be removed for the access road, and an additional 3 trees (29, 30 and 31) which includes one dead tree may be required to be removed for the installation of the 11kv Cable that will connect the north-east BESS sites to the north-east corner of the lot. Given the positioning of the impact area within the most disturbed areas of vegetation within the subject land and the retention of trees outside of the scope of the proposal, the proposed BESS installation and associated infrastructure is unlikely to have a significant impact on areas identified as Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions such that the local occurrence is likely to be placed at risk of extinction.

No threatened flora species were recorded within the survey area during fieldwork. Of the addressed 16 flora species assessed, the subject land was found to contain suitable habitat for 6 of the addressed species. The proposal may result in an incremental loss of marginal habitat for these threatened flora species; however, it is considered not likely that the proposal would significantly affect the life cycle of any of these threatened flora species or place any viable local populations of at risk of extinction.

No threatened fauna species were recorded during fieldwork. Of the 55 addressed threatened fauna species the subject site was considered to contain suitable habitat for 41 species. The proposal will

result in a small incremental reduction habitat for the above species. Given the small impact it is unlikely that the proposal will have a significant impact on these threatened fauna species such that a local extinction would occur.

The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 0.76ha of PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland intergrade;
- Removal of up to 0.76ha of highly disturbed example of the State listed EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions;
- Removal of up to 0.33ha of highly disturbed example of the Nationally listed CEEC Central Hunter Valley Eucalypt Forest and Woodland;
- Removal of up to four hollow-bearing trees, with the definite removal of one hollow-bearing tree (No. 12). Branch trimming of three hollow-bearing trees may also be required as a result of the proposal;
- Removal of suitable habitat for a number of the addressed threatened species.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (1999). PCT 3431 Central Hunter Ironbark Grassy Woodland within BESS Sites 2 and 3 and the proposed access roads to these BESS sites was found to be consistent with the Nationally Listed EPBC Act 1999 Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland. The majority of this CEEC within both impact areas consisted largely of derived grassland which was subject to ongoing grazing and weed incursion. The proposal will impact 0.33ha of this TECs, including the removal of one canopy specimen and potentially the removal of an additional 3 canopy specimens. Considering the relatively small impact on habitat in the locality it is unlikely that any of the nationally addressed threatened species or any of the listed migratory species would be significantly affected by the proposal.

In conclusion, the proposal will result in a small incremental reduction of PCT 3431 Central Hunter Ironbark Grassy Woodland Given the mitigation measures the proposal is unlikely to disrupt the life cycle of any addressed threatened species, endangered population or endangered ecological community such that local extinction would occur.

CONTENTS

Acronyms and Abbreviations used in this report

Acronym/Abreviation	Phrase
AOBV	Area of outstanding Biodiversity Value
BAAS	Biodiversity Assessors Accreditation System
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BESS	Battery Energy Storage System
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
BOSET	Biodiversity Offsets Scheme Entry Tool
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	Department of Planning and Environment (NSW)
EEC	Endangered Ecological Community
EPBC Act	Environmental Protection & Biodiversity Conservation Act 1999
EP&A Act	Environmental Planning & Assessment Act 1979
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS Act	Local Land Services Act 2013
MC	Muswellbrook Council
NES	Matters of National Significance under the EPBC Act
NPW Act	National Parks & Wildlife Act 1974
OEH	Office of Environment & Heritage (now DPE)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community

1.0 INTRODUCTION

Flora, fauna and habitat studies have been undertaken for the proposed installation of three Battery Energy Storage Systems (BESS) and associated Bushfire Asset Protection Zones (APZ's) and infrastructure such as an access road and 11kv cable at Lot 51 DP 776564 (No. 981) New England Highway, Aberdeen NSW. The investigations were in accordance with the requirements of the *Environmental Planning and Assessment Amendment Act 2017* (EP&A Act 2017), the *Biodiversity Conservation Act 2016* (BC Act 2016) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The results are presented here in the form of an Ecological Assessment.

1.1 THE SUBJECT LAND AND STUDY AREA

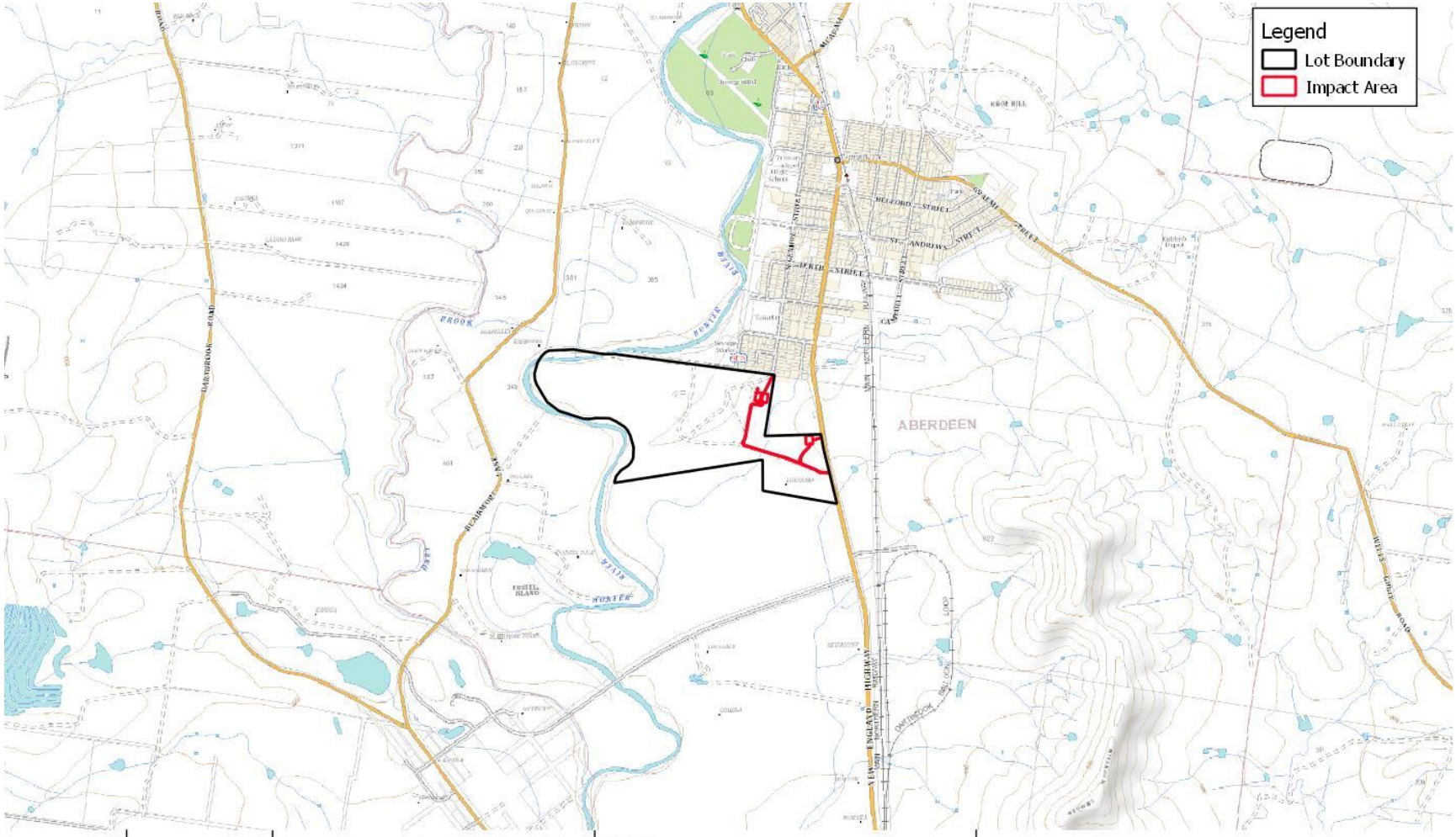
The 92.02ha subject land (Lot 51 DP 776564) (No. 981) was an irregular shaped lot located immediately south of the town of Aberdeen. The subject land was bounded by the New England Highway in the southeast, the Hunter River in the west, Public Recreation land, a Sewage Treatment Plant and General Residential development in the north and large rural lots to the west, east and south. The subject land is zoned as RU1 - Primary Production. The entire lot has been subject to historic native vegetation clearance, ongoing cattle grazing and irrigated cropping. Two residences and associated farm sheds were present. A concrete batching plant was also situated in the east of the subject land.

Vegetation within the subject land was highly modified and consisted of low maintained grazing grassland and cropping land. Areas of native vegetation in the form of remnant native trees such as *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus moluccana* (Grey Box) and *Eucalyptus melliodora* (Yellow Box) and associated derived areas of native grassland were present in parts of the east of the subject land. Associated derived areas of native grassland in various states of condition were also present in the east and far south. A narrow strip of riparian vegetation was present in parts of the far west of the subject land along the Hunter River were species such as *Casuarina cunninghamiana* subsp. *cunninghamiana* (River Oak) and the Endangered Population of *Eucalyptus camaldulensis* (River Red Gum) were present. Areas of remnant trees and derived grassland were present within the far east of the subject land where the three BESS sites (subject areas) are proposed to be located. No canopy species were present within close proximity to BESS Site 1. A number of specimens of *E. crebra* and *E. blakelyi* were present in close proximity to BESS Site 2 & 3.

A location map and aerial photo of the subject land and subject areas are shown in Figures 1.1 and 1.2.

1.2 THE PROPOSAL

It is proposed that a Battery Energy Storage System (BESS), associated road access and 11kv cable be installed within Lot 51 DP 776564 (No. 981) New England Highway, Aberdeen NSW. The BESS will be installed in three locations: one in the east of the site adjacent to the New England Highway with the remaining two sites located side by side within the north-east of the site. The existing unsealed road from the New England Highway through the Lot will cover the majority of the access to each of the



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0 500 1,000 1,500 m

Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023),

Figure 1.1

Location Map

981 New England Hwy,
ABERDEEN NSW

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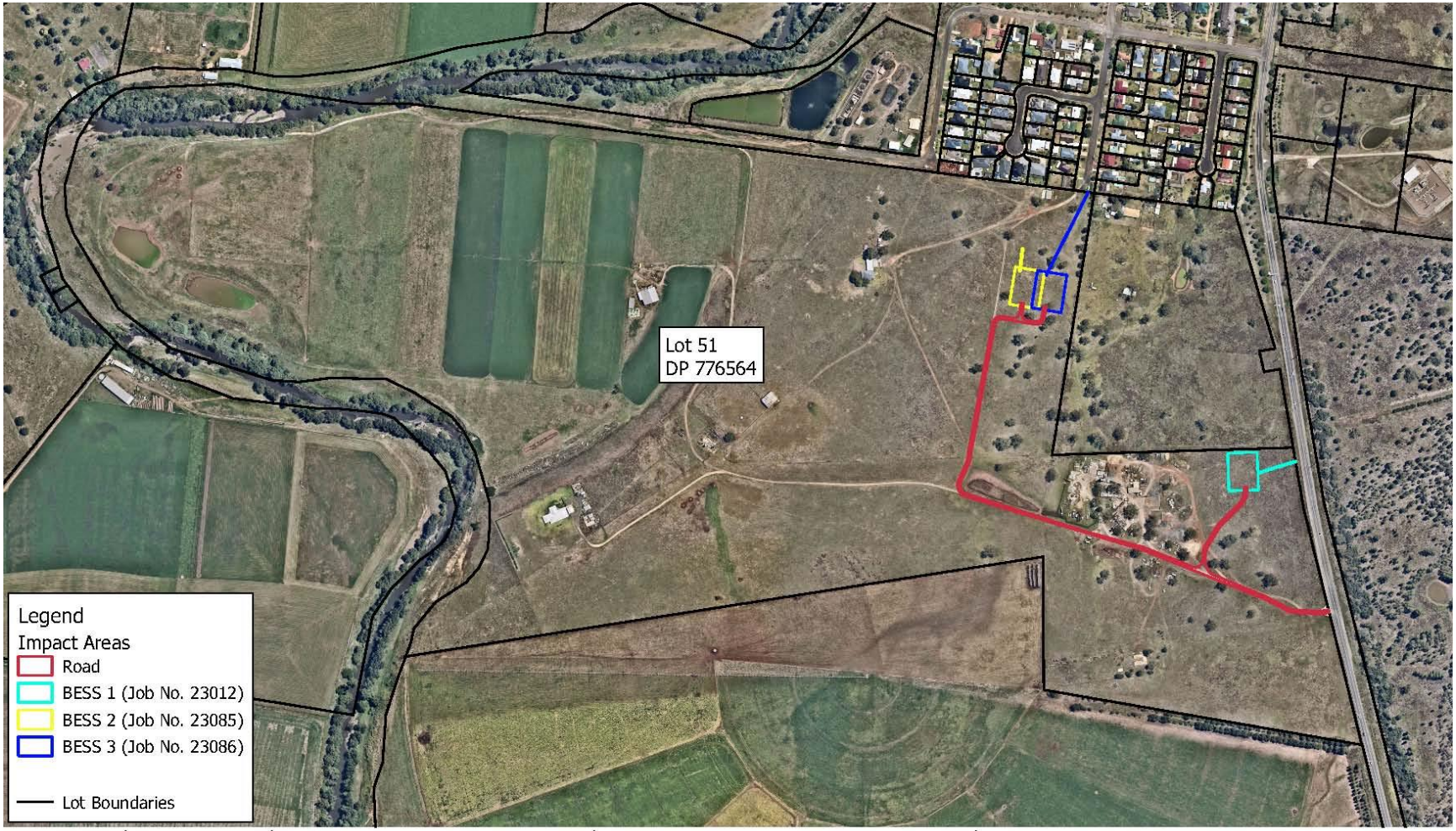

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Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023)

Figure 1.2

Location within Lot 51 DP 776564

981 New England Hwy, ABERDEEN NSW

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BESS locations. Shorter access roads will be required to be constructed off the existing access to each of the BESS sites. A 11kv Cable will connect the north-east BESS sites to the north-east corner of the lot.

A Bushfire Assessment Report (Hunter Valley Bushfire Consulting Services, 2023) has been completed. The assessment requires a 10m Inner Protection Asset Protection Zone (APZ) around each of the BESS sites.

Plans of the proposal are shown in Figures 1.3, 1.4 & 1.5.

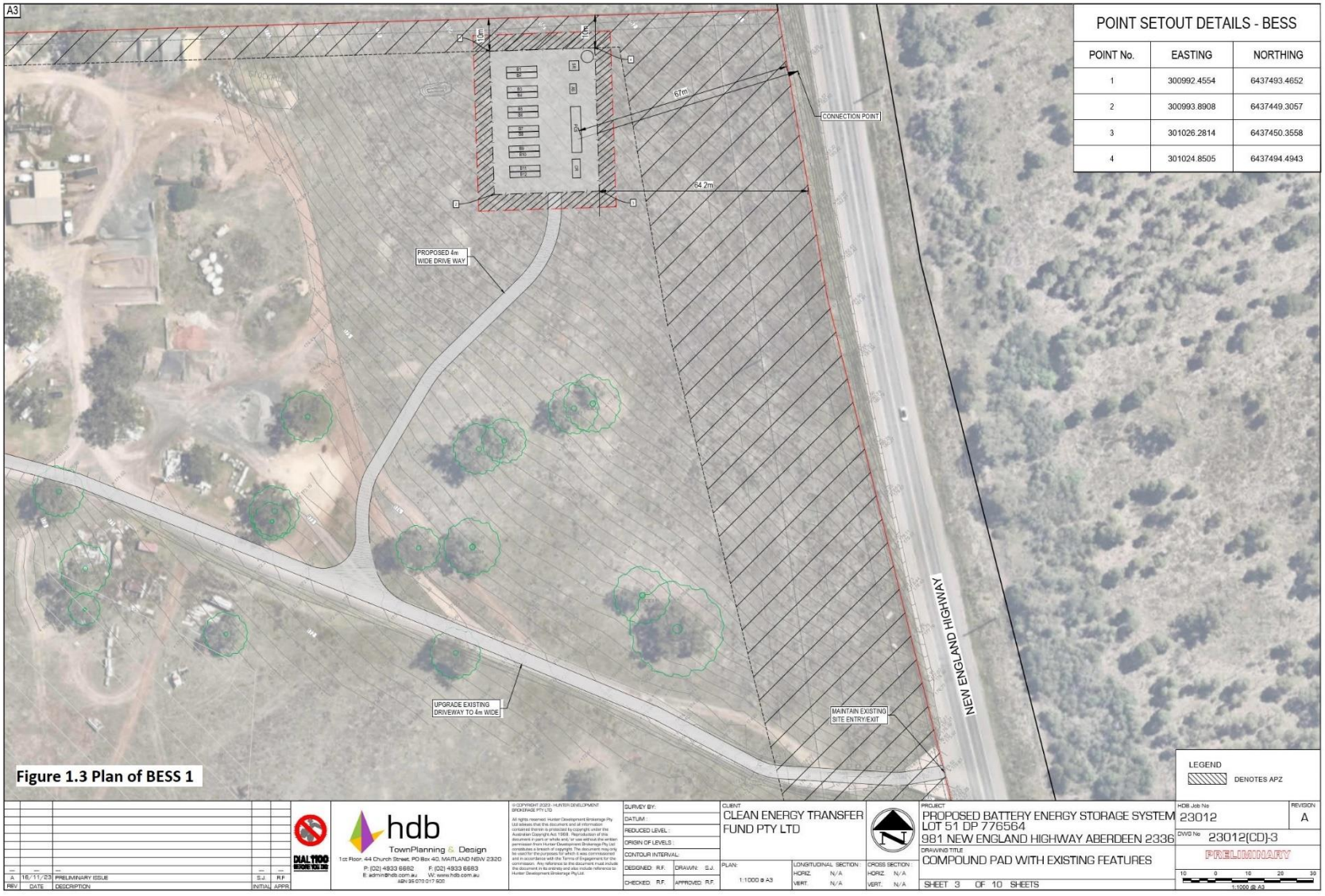


Figure 1.3 Plan of BESS 1

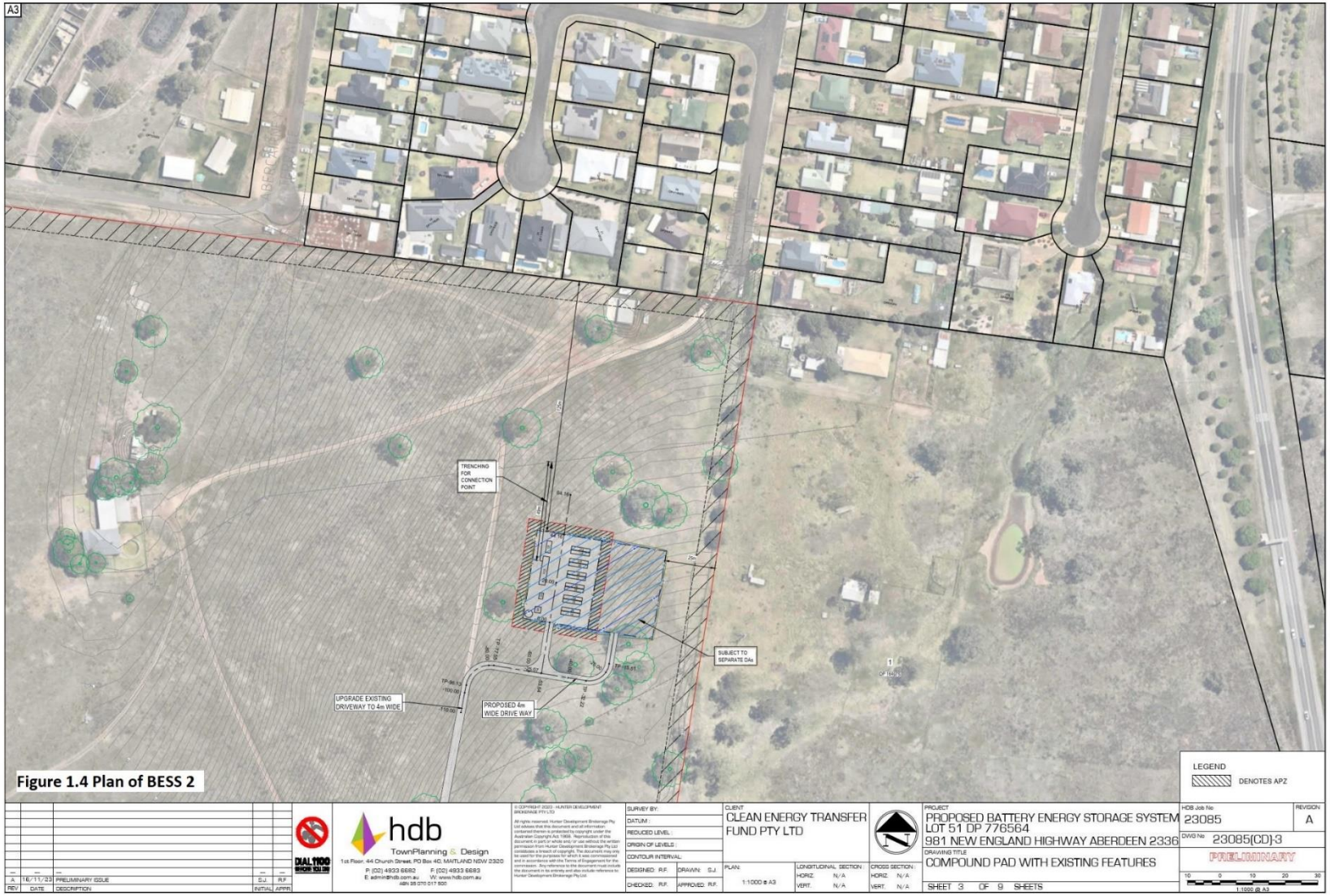


Figure 1.4 Plan of BESS 2

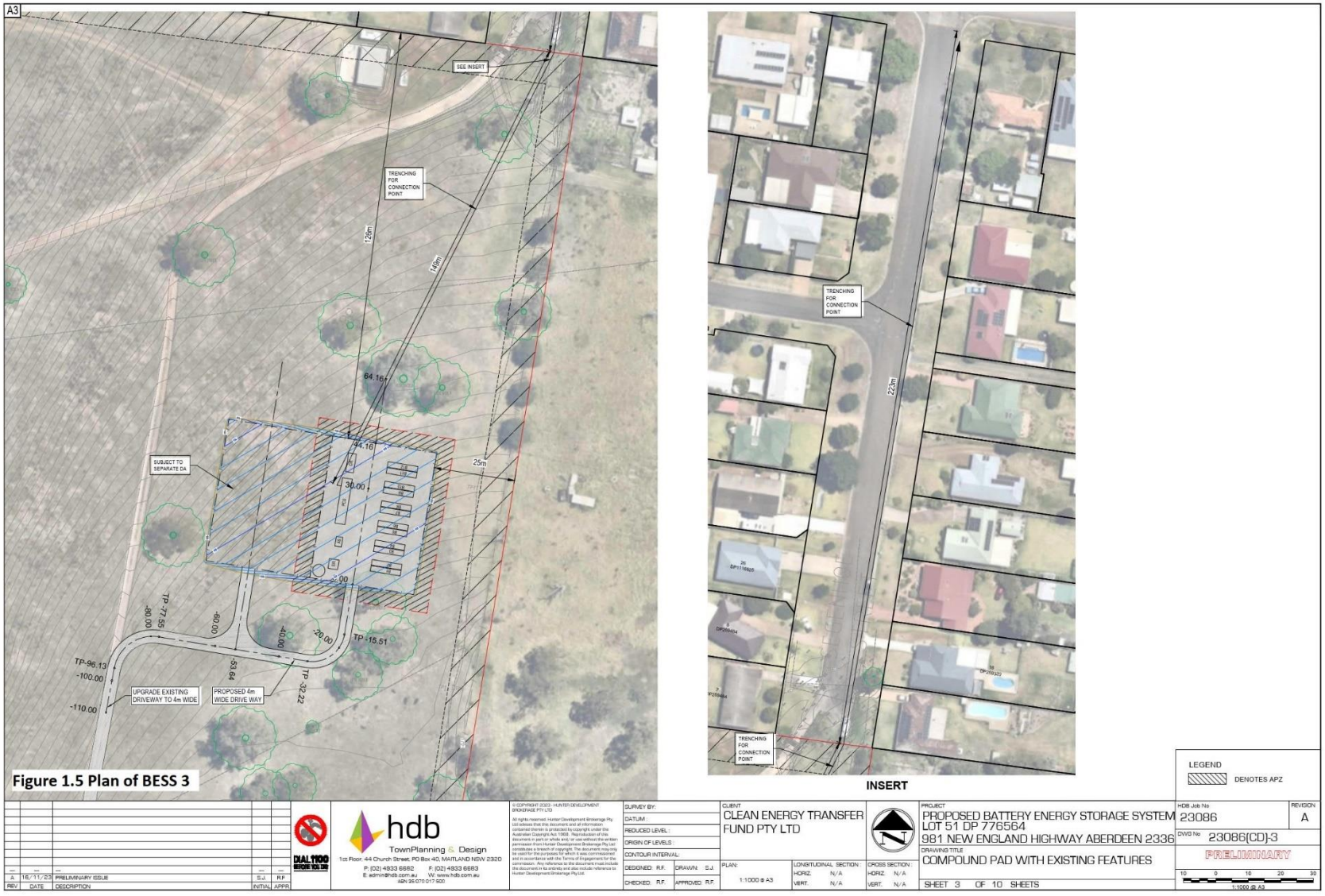


Figure 1.5 Plan of BESS 3

2.0 SUBJECT LAND CONTEXT

The subject land is located within the Sydney Basin Bioregion and Hunter Sub-bioregion (regions gazetted by the Minister, or an Interim Biogeographical Regionalisation of Australia (IBRA Bioregion). The subject land is located within the Muswellbrook Shire Local Government Area (LGA) and is zoned as RU1: Primary Production.

2.1 HYDROGEOGRAPHY

The subject land, occurs within the Greater Hunter River Catchment, with the Hunter River present along the western boundary of the subject land. A third order prescribed stream runs down through the lot to the east of the subject land leading south-west to the Hunter River traverses the lot to the east of the subject land before exiting down through the subject land. The existing access road between the BESS sites this prescribed stream.

2.2 TOPOGRAPHY AND SOILS

The subject land is located within the Upper Hunter Channels and Floodplains and Central Hunter Foothills BioNet Landscapes (Mitchell Landscape). The subject land contained two Soil Landscapes, Hunter (hu) in the east, west, northwest and south of the subject land, and Dartbrook (db) in the northeast of the subject land (Kovac and Lawrie 1991). The majority of the impact area was located within the Hunter Soil Landscape.

2.3 VEGETATION

Native vegetation in the impact areas was in the form of Open Woodland and/or derived native grassland. Native vegetation had been subject to disturbances such as past vegetation clearance, property maintenance activities, past and ongoing cattle grazing (cattle were observed on site during fieldwork), weed incursion and access tracks established within the site. Canopy species were reduced to scattered and clumped remnant trees particularly *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus moluccana* (Grey Box). Other canopy species present were *Eucalyptus melliodora* (Yellow Box) and *Eucalyptus blakelyi* (Blakely's Red Gum).

3.0 LEGISLATIVE CONTEXT

The following sections detail the legislative frameworks relevant to this report.

3.1 NSW ENVIRONMENTAL PLANNING AND ASSESSMENT AMENDMENT ACT 2017

The assessment of development applications in NSW is regulated under Part 4 or Part 5 of the EP&A Act. Part 1 Section 1.7 of the EP&A Act links proponents to Part 7 of the BC Act for the operation of the EP&A Act in connection with potential impacts to the terrestrial environment. The EP&A Act is also supported by other statutory environmental planning instruments, including State Environmental Planning Policies (SEPPs).

3.2 NSW BIODIVERSITY CONSERVATION ACT 2016

The purpose of the BC Act is "to establish a pathway to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity and to establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values".

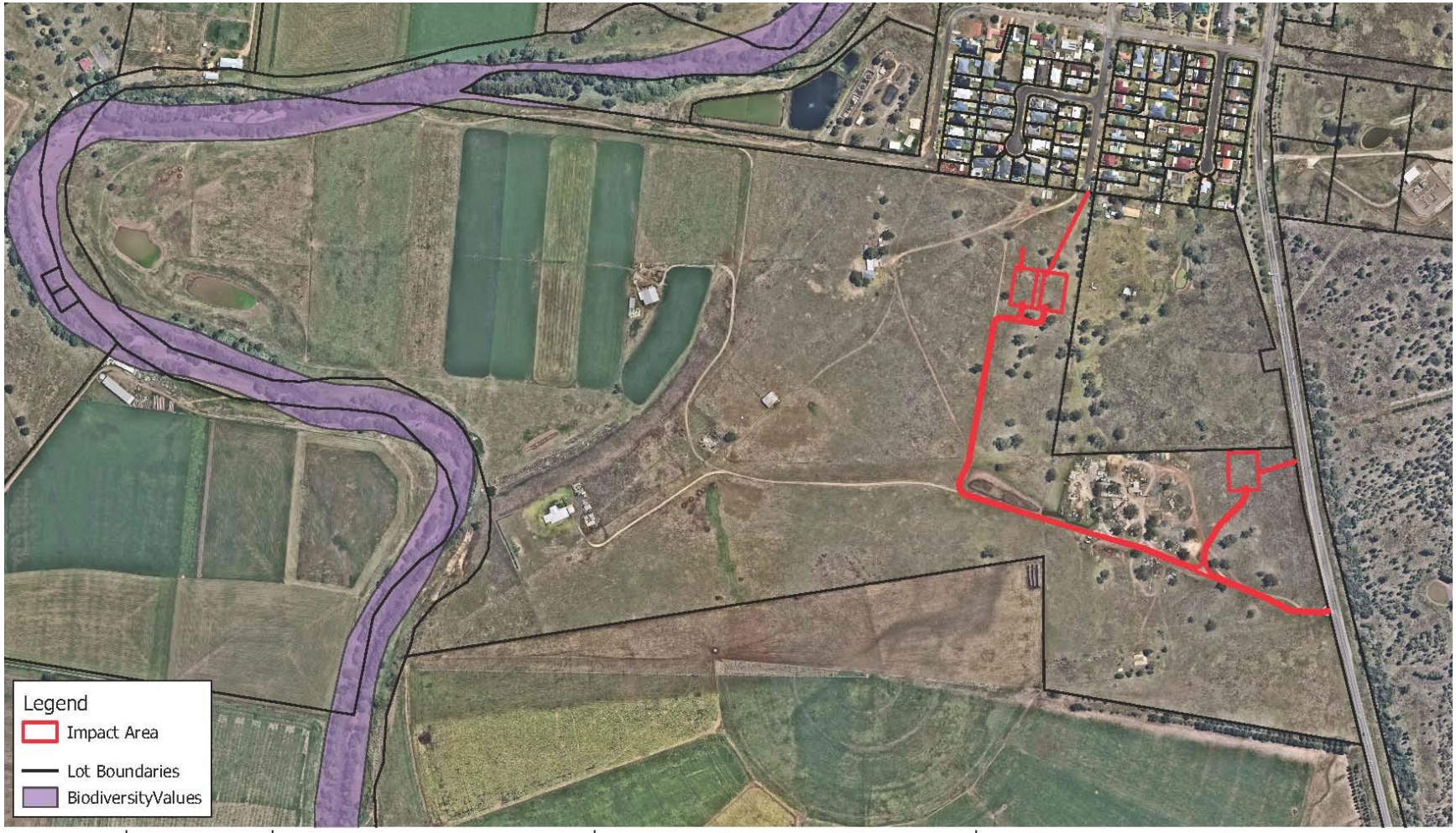
In accordance with the BC Act, the Biodiversity Assessment Method (BAM) and entry into the Biodiversity Offsets Scheme (BOS) is applicable to certain development activities based on specific Preparation of a Biodiversity Development Assessment Report (BDAR) is required for a development application that meets any of the following criteria detailed in Table 3.1.

As the proposed development was not found to comply within any of the criteria it was determined that a BDAR and entry into the BOS threshold would not be applicable for this development. Thus, the survey methodology detailed in the following sections have been undertaken in accordance with the requirements for a standard Assessment of Significance.

The BC Act also imposes various obligations on determining authorities in relation to impacts on biodiversity values that are serious and irreversible. For applications for development consent under Part 4 of the EP&A Act these obligations generally require a decision-maker to refuse to grant development consent. In order to provide clarity regarding what could be considered a serious and irreversible impact a guidance document has been released (NSW Gov 2017) which identifies the species and ecological communities (SAII entities) that are likely to be the subject of serious and irreversible impacts. No candidate SAII entities were found to be present within the subject land thus no obligation for development refusal would be applicable to this proposed development from relevant regulatory bodies.

Table 3.1: Criteria for entry into the Biodiversity Offsets Scheme in relation to the proposed development.

CRITERIA FOR ENTRY INTO THE BIODIVERSITY OFFSETS SCHEME (BOS)	SECTION CRITERIA ADDRESSED	ASSESSMENT OF CRITERIA
Part 4 development activities deemed to be 'State Significant' under the NSW Environmental Planning and Assessment Act 1979 (NSW EP&A Act)		The proposal is not recognised as State Significant
Development activities that have the potential to impact Areas of Outstanding Biodiversity Value (AOBV) as listed under Part 3 of the BC Act.	Section 7.0	No declared areas of outstanding biodiversity value were located within or in proximity to the site.
Development activities that have the potential to cause a significant impact on a threatened species, population or ecological community, listed under Schedules 1 and 2 of the BC Act, as determined by application of a five-part-test of significance in accordance with Section 7.3 of the BC Act;	Section 7.0	The five-part test found no significant impact on threatened species, populations or ecological communities listed under Schedules 1 and 2 of the BC Act.
Development activities that have the potential to impact areas mapped as having 'high biodiversity value' as indicated by the NSW Biodiversity Values Map (BV Map);	Section 3.0 Figure 3.1.	The NSW Biodiversity Values Map was consulted on the 28 November 2023. As of this date it was determined that there were areas of mapped 'Biodiversity Values' near the subject land however none will be impacted by the proposal. An extract of the Biodiversity Values Map has been provided in Figure 3.1.
Development activities that involve clearing of native vegetation that exceeds the Biodiversity Offset Scheme thresholds (BOS thresholds) as determined by the NSW BC regulation.	Section 6.0	The clearing threshold for the subject land is 1ha. The impact to native vegetation will be 0.76ha which is under 1ha. Consequently, the proposed development would not exceed the biodiversity offsets scheme threshold regarding Section 7.2(b) of the BC Act.



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Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023), DPE (2023b)

Figure 1.6

Biodiversity Values Map

981 New England Hwy,
ABERDEEN NSW

28 November 2023

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3.3 STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY AND CONSERVATION) 2021

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) consolidates transfers and repeals provisions of the following 11 SEPPs (or deemed SEPPs):

1. SEPP (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)
2. SEPP (Koala Habitat Protection) 2020 (Koala SEPP 2020)
3. SEPP (Koala Habitat Protection) 2021 (Koala SEPP 2021)
4. Murray Regional Environmental Plan No 2—Riverine Land (Murray REP)
5. SEPP No 19—Bushland in Urban Areas (SEPP 19)
6. SEPP No 50—Canal Estate Development (SEPP 50)
7. SEPP (Sydney Drinking Water Catchment) 2011 (Sydney Drinking Water SEPP)
8. Sydney Regional Environmental Plan No 20 – Hawkesbury – Nepean River (No 2 – 1997) (Hawkesbury–Nepean River SREP)
9. Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Sydney Harbour Catchment SREP)
10. Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (Georges River REP)
11. Willandra Lakes Regional Environmental Plan No 1 – World Heritage Property (Willandra Lakes REP).

Each consolidated SEPP now makes up a chapter in the SEPP (Biodiversity and Conservation) 2021. The subject land is located within the Muswellbrook Shire Council and is zoned as RU1. Therefore, the subject land falls under 'Chapter 3 Koala habitat protection' 2020 of the SEPP (Biodiversity and Conservation) 2021.

3.3.1 CHAPTER 3 KOALA HABITAT PROTECTION 2020

This Chapter aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline—

- by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- by encouraging the identification of areas of core koala habitat, and
- by encouraging the inclusion of areas of core koala habitat in environment protection zones.

This Chapter applies to land use zones RU1, RU2 and RU3 (or an equivalent land use zone) in LGAs specified in the SEPP (Biodiversity and Conservation) 2021, which includes the Muswellbrook Shire Council LGA. This Chapter has been addressed in Section 8 of this report.

3.4 BIOSECURITY ACT 2015

The NSW Biosecurity Act 2015 provides regulatory controls and powers to manage priority weeds in NSW. For weed management this Act divides NSW into regions based on combined LGAs and priority weeds for

a region are listed. Some weeds are managed at a state level as they form part of a broader containment strategy. The legislation compliments listed Weeds of National Significance (WoNS).

3.5 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on Matters of National Environmental Significance (MNES) undergo a process of assessment. Under the EPBC Act, an action includes a project, undertaking, development or activity that may impact MNES. An action that 'has, will have or is likely to have a significant impact on a MNES' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the commonwealth minister for the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

MNES categories listed under the EPBC Act are:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Threatened species and ecological communities (Section 18 and 18A);
- Migratory species;
- Commonwealth marine areas;
- Nuclear actions (including uranium mining); and
- A water resource, in relation to coal seam gas development and large coal mining development.

Initially MNES protected under the EPBC Act are assessed in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DoE 2013). This is performed to determine if there is likelihood for an action to have a significant impact on MNES. An action will require referral to, and may require the approval of, the commonwealth minister for the Environment (in addition to any local or state government consent or approval) if that action will have, or is likely to have, a significant impact on the environment or on a MNES.

3.6 LICENSING

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under NPWS Scientific Investigation Licence SL100345 and under Animal Care and Ethics Approval: Animal Research Authority Issue by the Department of Primary Industries (Trim File No. 13/251) for Fauna Survey for Biodiversity and Impact Assessment.

4.0 METHODOLOGY

4.1 DESKTOP ASSESSMENT

A site-specific literature and database review was undertaken prior to conducting the field survey and the preparation of this report. A list of the resources reviewed, the date they were accessed and the spatial extent of the search conducted, where relevant, is provided in Table 4.1.

Table 4.1: Desktop Resources

RESOURCE	LAST ACCESS DATE	SPATIAL EXTENT
Biodiversity Values and Landscape Maps		
BioNet Atlas of NSW Wildlife (BioNet) (DPIE 2023a)	2 November 2023	10x10km radius of subject land
Commonwealth Protected Matters Search Tool (PMST) (DCCEEW 2022a)	2 November 2023	10x10km radius of subject land
NSW Biodiversity Values Map (DPIE 2022b)	26 October 2023	Entire subject land
SIX Maps -Base Map - LPI 1:25,000 digital topographic databases (DTDB) (LPI 2022) -Cadastral data LPI digital cadastral database (DCDB) (LPI 2022)	November 2023	Entire subject land
NSW Government SEED Mapping (NSW Government 2022)	14 November 2023	Entire subject land
BioNet NSW (Mitchell) Landscapes – Version 3.1 (OEH 2016a)	14 November 2023	Entire subject land
NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 (DAWE 2016).	14 November 2023	Entire subject land
Threatened Species and Vegetation Databases		
Commonwealth species profiles and threats database (SPRAT) (DCCEEW 2022a)	14 November 2023	-
DPE Profiles of threatened species, population, and ecological communities (DPIE 2022d)	14 November 2023	-
DPE BioNet vegetation classification database (DPIE 2022c)	13 November 2023	-
Reports		
Hunter Valley Bushfire Consulting Services (2023). Bushfire Assessment Report (BAR) – proposed Battery Energy Storage System, Buildings of Class 5 to 8 (PBP, 2019, Part 8 – Other Development) 981 New England Highway, Aberdeen NSW.	May 2023	Study area
Plans		
Hdb Town Planning and Design Proposed Battery Energy Storage System Lot 51 DP 776564 (No. 981) New England Highway, Aberdeen NSW	November 2023	Study area

4.2 FIELD ASSESSMENT

Fieldwork was undertaken in November 2023. A summary of the time spent on site during fieldwork and the prevailing weather conditions at the time is contained in Table 4.2.

Table 4.2: Survey Dates, Times and Weather Conditions

DATE	TIME	SURVEY EFFORT (PERSON HOURS)	ACTIVITY	WEATHER
Monday 13/11/2023	0930 - 1330	4h (1 person)	General site inspection Vegetation survey Diurnal fauna survey Tree survey Incidental observations	3/8 Cloud, 22°C, 62% relative humidity, Wind 24km//hr SSE

A detailed methodology for the surveys listed within Table 4.2 above have been described in the following Sections 4.2.1 – 4.2.5:

4.2.1 VEGETATION ASSESSMENT

The initial determination of the basic vegetation community boundaries was undertaken through the review of an orthophoto covering the site. Following this, a detailed ground survey was conducted in accordance with the Department of Environment and Conservation's (NSW) Threatened Biodiversity Survey and Assessment Guidelines – Working Draft (Department of Environment and Conservation, 2004). Due to the high disturbance no vegetation plots or quadrats were undertaken. Flora searches were undertaken in the manner described by Cropper (1993) as the 'Random Meander Technique'. This involved walking in a random manner throughout the entire site particularly the impact area. A list of all flora species identified on site has been provided in Appendix A. Field survey tracks are shown in Figure 4.1.

4.2.2 DIURNAL FAUNA SURVEY

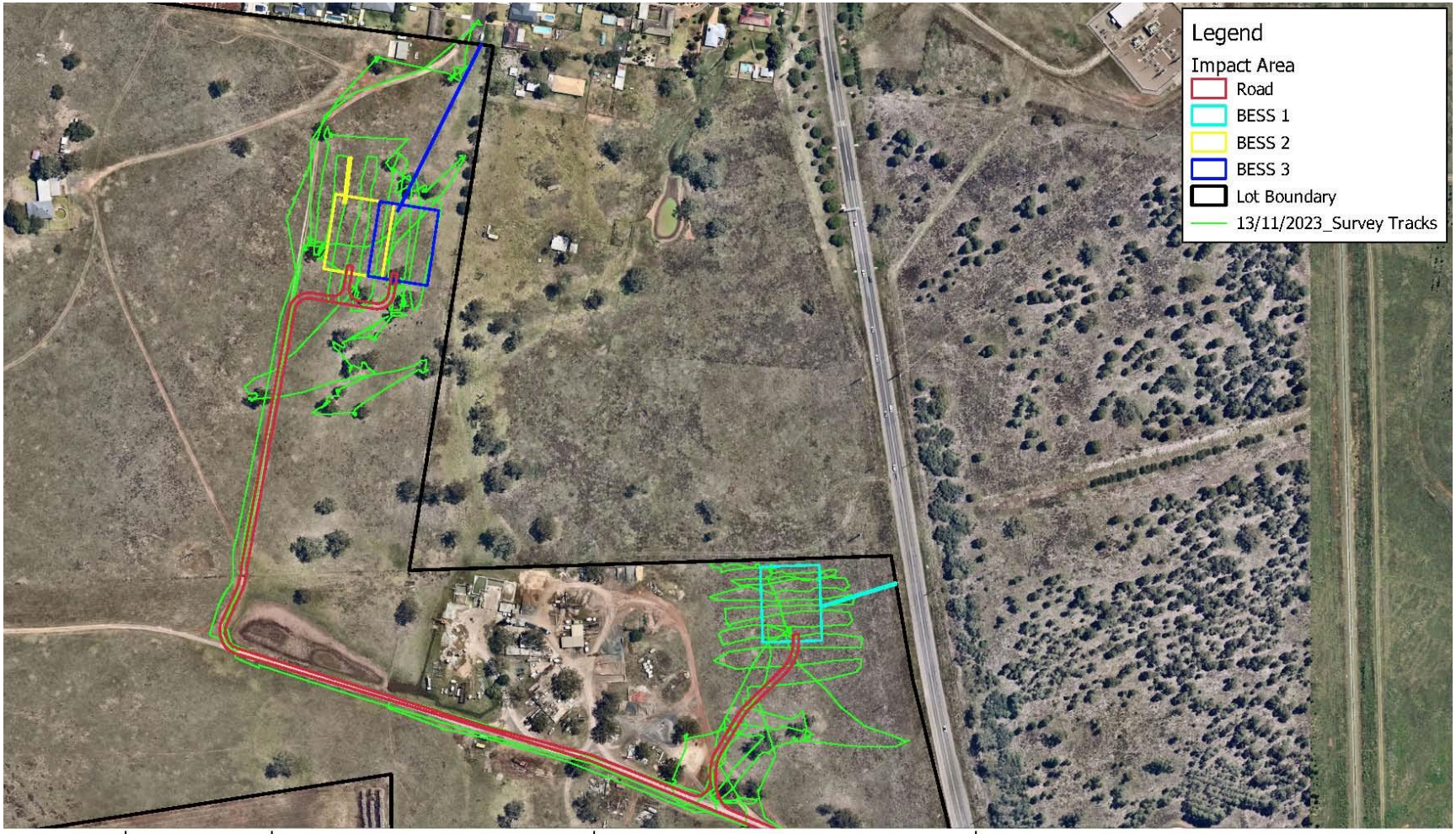
Opportunistic sightings of species and secondary indications (scats, scratches, diggings, tracks etc.) of resident fauna were noted and included:

- dedicated searches for avifauna;
- dedicated searches for herpetofauna;
- checks for obvious nests of raptors;
- checking trees (particularly smooth-barked species) for scratches consistent with arboreal mammals.

4.2.3 GENERAL HABITAT FOR NATIVE SPECIES

From the vegetation appraisal, diurnal fauna survey and a general inspection of the site and surrounding areas, a subjective assessment of the general habitat value of this site was made. Considered in this assessment were:

- occurrence of that habitat type in the general vicinity;
- degree of disturbance and degradation;
- area occupied by that habitat on site;



Job Ref	12831
A4 Scale	1:3,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee is given that the information protrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

0 50 100 150 m

Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023)

Figure 4.1

Survey Tracks

981 New England Hwy,
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- continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors; and
- structural and floral diversity.

4.2.4 TREE SURVEY

During the fieldwork, a survey was undertaken to identify trees in the subject areas (impact areas) and within close proximity. The survey also involved identifying any hollow-bearing trees present. Hollow-bearing trees are a habitat resource utilised by a variety of native avifaunal and mammalian species. This resource is usually a limiting factor in the occurrence of hollow-dependent species on a site, due to the time taken for hollows to form in trees.

It must be noted that observations made from ground level may fail to record a small number of hollows that are obscured. Some entrances may also not lead to a cavity. The internal dimensions of the hollows are also impossible in many cases to determine from the ground.

4.2.5 HABITAT FOR SIGNIFICANT SPECIES

The subject areas were evaluated as potential habitat for each of the threatened species reported on the BioNet (DPE, 2023a) and PMST (DCCEEW, 2023) databases from within 10km of the site. This evaluation was based on home range, feeding, roosting, breeding, movement patterns and corridor requirements for fauna and hydrology, soil types, aspect and structural formation for flora species. The list of threatened species recorded within these databases is provided within Table 4.3 and an assessment of the likelihood of occurrence of these threatened species within the subject land is provided in Table 5.3.

4.3 SIGNIFICANT SPECIES

The following threatened species listed in Table 4.3 have been recorded on the BioNet (DPE, 2023a) and PMST (DCCEEW, 2023a) Databases as occurring within 10km of the subject land. Species marked with an asterisk (*) are listed on the DCCEEW Database as having habitat likely to occur within 10km of the subject land.

Table 4.3: Threatened species, endangered populations and ecological communities considered.

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Flora Species			
Diuris tricolor	Pine Donkey Orchid	V	
**Prasophyllum* sp. *Wybong*	A Leek Orchid		CE
**Euphrasia arguta*			CE
**Pterostylis gibbosa*	Illawarra Greenhood	E1	E
**Dichanthium setosum*	Bluegrass	V	V
**Cynanchum elegans*	White-flowered Wax Plant	E1	E
**Prostanthera cineolifera*	Singleton Mint Bush	V	V
Vincetoxicum forsteri (*Tylophora linearis*)		V	E
**Eucalyptus glaucina*	Slaty Red Gum	V	V
**Picris evae*	Hawkweed	V	V
**Ozothamnus tesselatus*		V	V
**Pomaderris brunnea*	Brown Pomaderris	E1	V
**Swainsona murrayana*	Slender Darling-pea	V	V
**Lepidium aschersonii*	Spiny Peppercress	V	V
**Androcalva procumbens (Commersonia procumbens)*		V	V
**Thesium australe*	Austral Toadflax	V	V
Amphibians			
**Litoria booroolongensis*	Booroolong Frog	E1	E
**Heleioporus australiacus*	Giant Burrowing Frog	V	V
Reptiles			
**Aprasia parapulchella*	Pink-tailed Worm-lizard	V	V
**Delma impar*	Striped Legless Lizard	E	E
Birds			
**Calidris ferruginea*	Curlew Sandpiper	E1	CE & M
**Rostratula australis*	Australian Painted Snipe	E1	E
**Melanodryas cucullata cucullata*	Hooded Robin (south-eastern)	E	E
**Botaurus poiciloptilus*	Australasian Bittern	E1	E
**Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V	
**Callocephalon fimbriatum*	Gang Gang Cockatoo	V	E
**Lathamus discolor*	Swift Parrot	E1	CE
**Neophema chrysostoma*	Blue-winged Parrot	V	V
**Polytelis swainsonii*	Superb Parrot	V	V
Glossopsitta pusilla	Little Lorikeet	V	
**Aphelocephala leucopsis*	Southern Whiteface	V	V
**Hirundapus caudacutus*	White-throated Needletail		V & M
Ephippiorhynchus asiaticus	Black-necked Stork	E1	
Circus assimilis	Spotted Harrier	V	
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	
Petroica boodang	Scarlet Robin	V	
Petroica phoenicea	Flame Robin	V	
**Climacteris picumnus victoriae*	Brown Treecreeper	V	
**Stagonopleura guttata*	Diamond Firetail	V	
Pomatostomus temporalis subsp. *temporalis*	Grey-crowned Babbler	V	
Chthonicola sagittata	Speckled Warbler	V	
**Anthochaera phrygia*	Regent Honeyeater	E4A	CE
**Grantiella picta*	Painted Honeyeater	V	V
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	
Haematopus longirostris	Pied Oystercatcher	E1	

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
**Erythrotriorchis radiatus*	Red Goshawk	E4A	V
Hieraaetus morphnoides	Little Eagle	V	
**Falco hypoleucos*	Grey Falcon	E1	V
Falco subniger	Black Falcon	V	
Ninox strenua	Powerful Owl	V	
Tyto novaehollandiae	Masked Owl	V	
Tyto tenebricosa	Sooty Owl	V	
Mammals			
**Dasyurus maculatus*	Spotted-tailed Quoll	V	E
Phascogale tapoatafa	Brush-tailed Phascogale	V	
**Phascolarctos cinereus*	Koala	E1	E
**Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V
**Notamacropus parma*	Parma Wallaby	V	
**Petaurus australis*	Yellow-bellied Glider	V	
Petaurus norfolcensis	Squirrel Glider	V	
**Petauroides volans*	Greater Glider	E	E
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
**Pseudomys novaehollandiae*	New Holland Mouse		V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	
Micronomus norfolkensis	Eastern Freetail-bat	V	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Miniopterus australis	Little Bentwing-bat	V	
Miniopterus orianae oceanensis	Large Bentwing-bat	V	
Myotis macropus	Southern Myotis	V	
**Nyctophilus corbeni*	Corben's Long-eared Bat	V	V
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
**Chalinolobus dwyeri*	Large-eared Pied Bat	V	V
Vespadelus troughtoni	Eastern Cave Bat	V	
Endangered Populations			
Acacia pendula (Weeping Myall) – population in the Hunter Catchment		E2	
Cymbidium canaliculatum population in the Hunter Catchment		E2	
Eucalyptus camaldulensis (River Red Gum) – population in the Hunter Catchment		E2	
Diuris tricolor (Pine Donkey Orchid) - population in the Muswellbrook local government area			
Endangered Ecological Communities			
Central Hunter Grey Box - Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		E3	CE
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions		E3	CE
*Central Hunter Valley eucalypt forest and woodland			E3
*Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland			E
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions		E3	E
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions		E3	
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
*Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions			E
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		E3	
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions		E3	

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions		E3	
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion		V2	CE
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions		E3	
Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion		E4B	CE
*Hunter Valley Weeping Myall (Acacia pendula) Woodland			CE
*Weeping Myall Woodlands			E
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions		E3	
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion		E3	
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions		E3	CE
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		E3	
*Lowland Rainforest of Subtropical Australia			CE
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions		E3	
Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions		V2	
*Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland			CE
Quorrobolong Scribbly Gum Woodland in the Sydney Basin Bioregion		E3	
*River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria			CE
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Sydney Freshwater Wetlands in the Sydney Basin Bioregion		E3	
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		E3	
Warkworth Sands Woodland in the Sydney Basin Bioregion		E3	CE
*Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions			E
*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			CE

E1/E=Endangered Species E2=Endangered Population E3=Endangered Ecological Community
V=Vulnerable Species V2= Vulnerable Ecological Community E4A/E4B/CE=Critically Endangered
M=Migratory Species

5.0 RESULTS

5.1 FLORA ASSEMBLAGES

Vegetation within the subject land was highly modified and largely consisted of low maintained grazing and cropping land. Areas of native vegetation in the form of scattered and clumped remnant native trees such as *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus moluccana* (Grey Box) and *Eucalyptus melliodora* (Yellow Box). Associated derived areas of native grassland in various states of condition were also present in the east and far south of the subject land. A narrow strip of riparian vegetation was present in parts of the far west of the subject land along the Hunter River were species such as *Casuarina cunninghamiana* subsp. *cunninghamiana* (River Oak) and the Endangered Population of *Eucalyptus camaldulensis* (River Red Gum) were present.

The vegetation within the subject BESS Sites was stratified and areas of native vegetation were assigned a Plant Community Types (PCTs) detailed in the NSW Vegetation Information System (VIS) classification database. The vegetation was difficult to assign a single PCT and was considered to be a combination of two PCT's, PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland. Taking into consideration the dominance of the canopy species *Eucalyptus crebra* (Narrow-leaved Ironbark) and presence of *Eucalyptus moluccana* (Grey Box) the PCT 3431 Central Hunter Ironbark Grassy Woodland was assigned to all three BESS sites.

Areas of remnant trees and derived grassland were present within the far east of the subject land where the three BESS sites (subject areas) are proposed to be located. No canopy species were present within close proximity to BESS Site 1. A number of specimens of *E. crebra, E. blakelyi* and *E. melliodora* were present within and in close proximity to BESS Site 2 & 3.

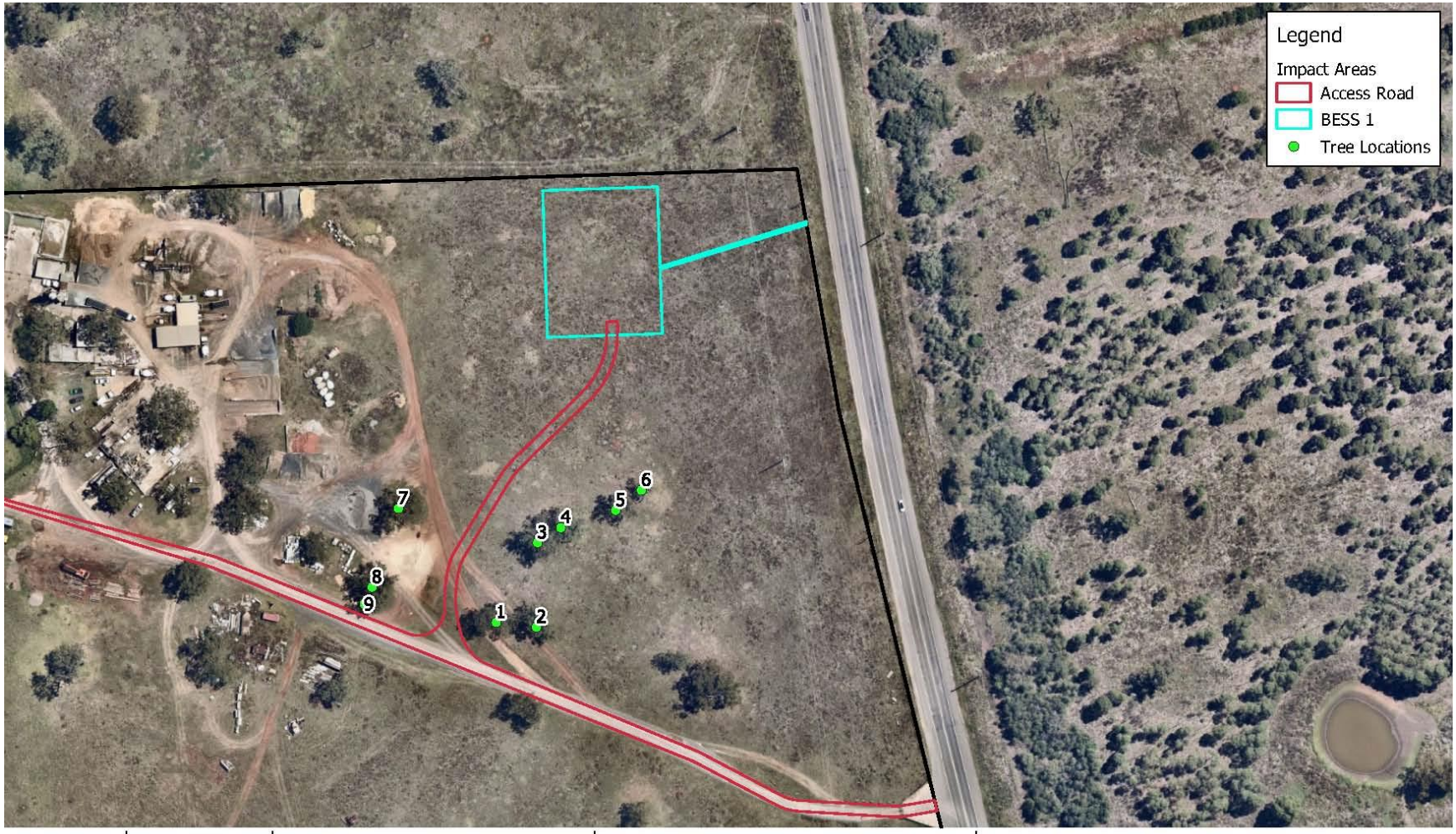
The original native mid and shrub layer was absent from all BESS sites. An exception was a couple of specimens of *Maireana microphylla* (Small-leaf Bluebush) within the vicinity of BESS Site 1. The ground layer was maintained low by cattle grazing and was composed of a mixture of native and introduced grasses and herbs. Common native grasses common to both sites were *Sporobolus creber* (Slender Rat's Tail Grass), *Enteropogon acicularis* (Curley-windmill Grass), *Cynodon dactylon* (Couch) and *Bothriochloa macra* (Red-leg Grass). *Austrostipa scabra* (Speargrass) was another native grass species within BESS Sites 2 & 3. *Sida corrugata* (Corrugated Sida), *Rumex brownii* (Slender Dock) and *Erodium crinitum* (Blue Storksbill) were common native ground covers to both sites. Although lacking trees BESS Site 1 had a greater diversity of other native groundcovers than BESS Sites 2 & 3. These species included *Boerhavia domini* (Tarvine), *Sida hackettiana* (Golden Rod), *Calotis lappulacea* (Yellow Burr-daisy), *Dichodra repens* (Kidneyweed), *Einadia nutans* (Climbing Saltbush) and *Convolvulus erubescens* (Blushing Bindweed). Common introduced groundcovers were *Galenia pubescens* (Galenia), *Heliotropium amplexicaule* (Blue Heliotrope), *Circium vulgare* (Black Thistle), *Carthamus lanatus* (Saffron Thistle), *Verbena bonariensis* (Purple Top Verbena), *Cenchrus clandestinus* (Kikuyu), *Silybum marianum* (Variegated Thistle) and *Hordeum leporinum* (Barley Grass).

Vegetation either side of the existing access road consisted of mainly low grazed native and introduced grasses that had been grazed by cattle.

A small dam was present along the existing access road between BESS Site 1 and Bess Sites 2 & 3. Common aquatic plants recorded were the native *Paspalum distichum* (Water Couch) and introduced *Cyperus eragrostis* (Umbrella Sedge), *Cenchrus clandestinus* (Kikuyu) and *Argemone ochroleuca* (Mexican Poppy).

A vegetation map of the site showing the location of remnant trees within close proximity to BESS Sites 1, 2 & 3 is shown in Figures 5.1 and 5.2. The area of impacted native vegetation is shown in Figure 5.3.

A full list of the flora species recorded during the fieldwork is listed in Appendix A.



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Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee is given that the information protrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

0 25 50 75 m

Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023)

Figure 5.1

Tree Locations and Vegetation Map at BESS 1

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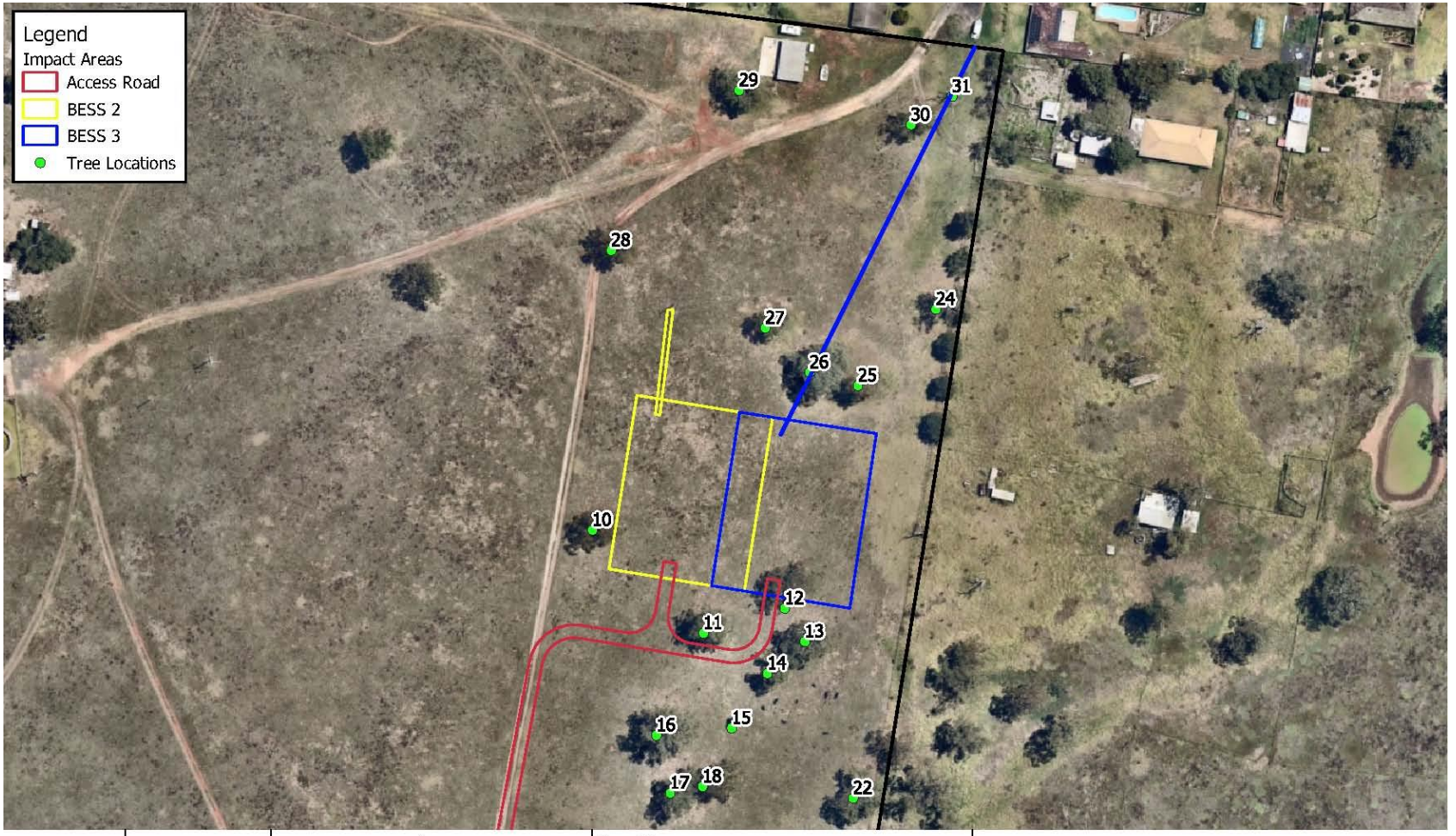

Job Ref	12831
A4 Scale	1:1,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee is given that the information protrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

0 25 50 75 m

Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023)

Figure 5.2

Tree Locations and Vegetation Map at BESS 2 & 3

981 New England Hwy,
ABERDEEN NSW

1 December 2023

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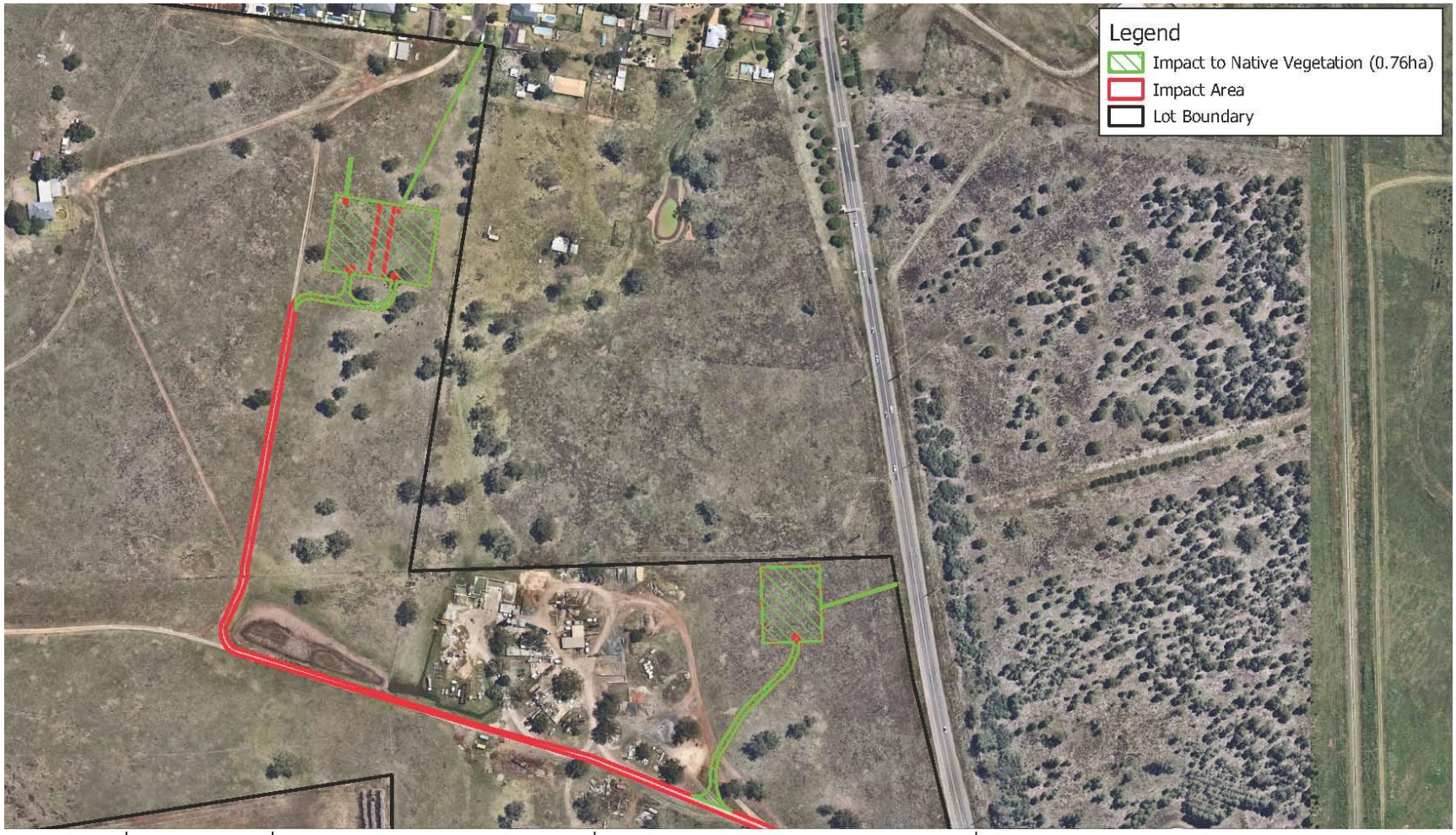

Job Ref	12831
A4 Scale	1:3,500

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0 50 100 150 m

Map Projection GDA2020 MGA Zone 56

Data Sources: LPI (2023), Nearmap (2023)

Figure 5.3

Impact to Native Vegetation

981 New England Hwy,
ABERDEEN NSW

28 November 2023

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Plate 1: BESS Site 1 (facing south-east).

Plate 2: BESS Site 1 (facing south).

Plate 3: BESS Site 1 (facing north).

Plate 4: BESS Site 1 (facing west).

Plate 5: BESS Site 1 (facing east).

Plate 6: Area showing proposed access to BESS Site 1 (facing south).

Plate 7: Area showing proposed access to BESS Site 2 (facing east) (Tree No. 10 in the foreground).

Plate 8: Area showing proposed access to BESS Site 2 (facing east) (Tree No. 11 in the foreground).

Plate 9: Area showing proposed access to BESS Sites 2 & 3 (facing north-east) (Tree No. 12 in the foreground).

Plate 10: Area showing proposed access to BESS Sites 2 & 3 (facing south) (Tree No. 11 & 12 in the distance).

Plate 11: Area showing proposed access to BESS Sites 2 & 3 (facing north) (Tree No. 26, 27 & 28 in the distance).

Plate 12: Area showing proposed access to BESS Site 2 & 3 (facing north) (Tree No. 10 in the distance).

Plate 13: Existing Access Road (facing north toward BESS Sites 2 & 3.

Plate 14: Existing Access Road (area of proposed access to BESS Site 1).

Plate 15: Existing Access Road in south between BESS sites.

Plate 16: Dam along existing access road in the south between BESS sites.

5.1.1 THREATENED ECOLOGICAL COMMUNITIES

Thirty-three threatened ecological communities (TECs) have been recorded within the region according to both the BioNet (DPE, 2023) and PMST databases, results of the database search conducted for TECs are shown within Table 4.3.

The vegetation within the site was stratified and areas of native vegetation were assigned a Plant Community Types (PCTs) detailed in the NSW Vegetation Information System (VIS) classification database. Vegetation within the BESS sites were difficult to assign a single PCT and was considered to be a combination of two PCT's, PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland.

PCT 3431 Central Hunter Ironbark Grassy Woodland within the subject areas was found to be consistent with the listed NSW BC Act 2016 Endangered Ecological Community (EEC) Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions. The majority of this EEC within all impact areas consisted of derived grassland which was subject to ongoing grazing and weed incursion. No trees (canopy species) were present within BESS Site 1. A number of older remnant tree species were present on the edges of BESS site 2 & 3. At least one of these trees (Tree No. 12) will be required to be removed for the access road, and an additional 3 trees (29, 30 and 31) including one dead tree may be required to be removed for the installation of the 11kv Cable that will connect the north-east BESS sites to the north-east corner of the lot. The proposal will impact 0.76ha of both TECs, including the removal of one canopy specimen and potentially the removal of an additional 3 canopy specimens. Impacts to the State listed TEC have been addressed within Section 6.0 and 7.0 of this report.

PCT 3431 Central Hunter Ironbark Grassy Woodland within BESS Sites 2 and 3 and the proposed access roads to these BESS sites was found to be consistent with the Nationally Listed EPBC Act 1999 Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland. Under the National Legislation (EPBC Act 1999), Approved Conservation Advice for Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland (DoEE 2016), derived native grassland and shrublands are not included in the Critically Endangered Community Central Hunter Valley Eucalypt Forest and Woodland CEEC. The exceptions are where there is a gap, in or at the edge of a patch; or connecting two patches across a short distance (i.e., 30 metres). No trees (canopy species) were present within BESS Site 1 and therefore was not found to be consistent with this CEEC. A number of older remnant tree species were present on the edges of BESS site 2 & 3. At least one of these trees (Tree No. 12) will be required to be removed. The majority of this CEEC within both impact areas consisted largely of derived grassland which was subject to ongoing grazing and weed incursion. The proposal will impact 0.33ha of this TECs, including the removal of one canopy specimen and potentially the removal of an additional 3 canopy specimens. Impacts to the Nationally listed TEC have been addressed within Section 6.0 and 10.0 of this report.

5.1.2 ENDANGERED POPULATIONS

Four Endangered Populations are listed in the local area:

- *Acacia pendula* (Weeping Myall) – population in the Hunter Catchment
- *Cymbidium canaliculatum* population in the Hunter Catchment
- *Eucalyptus camaldulensis* (River Red Gum) – population in the Hunter Catchment
- *Diuris tricolor* (Pine Donkey Orchid) - population in the Muswellbrook local government area

No endangered populations or were recorded within the subject land.

5.1.3 THREATENED AND RARE FLORA SPECIES

Sixteen threatened plant species have been recorded within 10km of the subject land according to the BioNet database (DPE, 2023) or are considered to have suitable habitat on the PMST database. The results of the database search conducted for threatened flora species is shown within Table 4.3.

Of the addressed threatened flora species, the most likely species to be present within the subject land were *Diuris tricolor*, *Prasophyllum* sp. Wybong; *Pterostylis gibbosa*; *Tylophora linearis, Eucalyptus glaucina*; *Picris evae, Ozothamnus tesselatus* and *Thesium australe.* Of these species *E. glaucina* would be most likely to be present on site. None of these species were observed within the site despite targeted searches. No suitable habitat is considered to be available for the remaining species. The impact of the proposal on threatened flora species has been addressed in Section 7.0 of this report.

5.1.4 PRIORITY WEEDS AND WEEDS OF STATE AND NATIONAL SIGNIFICANCE

Three priority weed species listed under the Biosecurity Act 2015 were identified on site and are listed below in Table 5.5. The site lies within the Hunter Regional Weed Committee (HRWC).

Table 5.4: Priority Weed species found within the subject land.

WEED SPECIES	LEGAL REQUIREMENTS	ADDITIONAL SIGNIFICANCE
Senecio madagascariensis Fireweed	General Biosecurity Duty Regional Recommended Measure	N
Carthamus lanatus Saffron Thistle	General Biosecurity Duty	
Lycium ferocissimum African Boxthorn	General Biosecurity Duty Regional Recommended Measure	N

T – Listed as a Threatening Process under the NSW BC Act 2016.
N –Weed of National Significance.

***Priorities under the Biosecurity Act 2015**

General Biosecurity Duty - any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

Prohibition on dealings - Must not be imported into the State or sold.

Regional Recommended Measure - Land managers mitigate the risk of the plant being introduced to their land. Land managers reduce impacts from the plant on priority assets. Land managers prevent spread from their land where feasible. The plant or parts of the plant are not traded, carried, grown or released into the environment.

It is recommended that priority and other invasive weeds are controlled as part of routine asset maintenance.

5.2 HABITAT APPRASIAL

5.2.1 HABITAT DESCRIPTION AND DISTRIBUTION IN THE VICINITY

The vegetation and landforms present within the subject land offer potential habitat for a number of native species. The broad habitat types within the subject land consisted of Open Woodland and Disturbed Grassland. A small area of aquatic habitat was also present along the access road.

Open Woodland and Disturbed Grassland

Open Woodland would provide suitable habitat opportunities for a variety of species. Frugivorous, nectivorous, granivorous and insectivorous birds and microchiropteran bat species would all find potential foraging resources within this complex. Hollow-bearing trees would provide nesting and roosting sites for a variety of avifauna and other hollow dependant species such as arboreal mammals and tree-roosting bats. The presence of flowering myrtaceous species would offer potential seasonal foraging habitat for Flying Foxes. Hunting opportunities exist for birds of prey. Such habitat is suitable for terrestrial species including small and medium sized mammals, macropods and reptiles.

Disturbed Grassland

Disturbed Grassland provides habitat for a number of avifauna species, including predominantly terrestrial species preferring open spaces, seed eating birds and several birds of prey, which may hunt over this area in search of potential prey species. Macropods may also frequent such areas whilst grazing. Some species of bats may also forage over this cleared area for insects. The scarcity of trees and shrubs along with the close proximity of a road often limits the value of such areas for many species, particularly some reptiles, small mammals and birds which are vulnerable to vehicle strike predation in open spaces.

Aquatic Habitat Dam

The first and third order tributaries of Deadman's Creek would provide suitable habitat for a range of frog, reptile, mammal and some waterbird species. This area would also act as a water source for other native animals such as macropods and offer potential hunting habitat for microchiropteran bats such as *Myotis macropus* (Southern Myotis) that prefer to hunt above or around water bodies.

5.2.2 TREE SURVEY

A total of 31 native trees were recorded within the study area, however not all trees will require removal. One tree (Tree No. 12) will likely require removal for the proposed eastern Battery Energy Storage System (BESS) within the north-east of the site. An additional 3 trees (Tree Nos. 26, 30 and 31) may require possible removal for the 11kv Cable that will connect the north-east BESS sites to the north-east corner of the lot. Trenching for the cable will likely impact the structural root zone of these trees. There is scope to reposition the cable to avoid the removal of these trees as there is a large area of land devoid of canopy species located adjacent to the trees within the subject land. It is recommended that Tree No. 26, 30 and 31 be retained within the scope of the proposal by avoiding the structural root zones of these trees during trenching for the cable. Tree Numbers 10 & 11 may also require possible branch trimming.

All trees potentially impacted by the proposal are hollow-bearing trees. The proposal will require the removal of up to four hollow-bearing trees, with the definite removal of one hollow-bearing tree, and likely removal of an additional three hollow-bearing trees. Branch trimming of three hollow-bearing trees may also be required as a result of the proposal. It is recommended that tree removal be avoided wherever possible. Details of each of the 31 trees including height, diameter at breast height (DBH), coordinates and fauna habitat attributes such as hollows are contained Appendix B. The location of the 31 trees is shown in Figures 5.1 and 5.1.

5.3 HABITAT FOR SIGNIFICANT SPECIES

An assessment of habitat attributes on site has been undertaken for the significant species listed in Table 4.3. The results of the assessment using definitions shown in Table 5.4 are displayed in Table 5.5. Threatened species identified in this assessment as having potential habitat available on site have been considered further in Section 7.0 of this report.

Table 5.4: Definitions of likelihood of occurrence criteria.

Likelihood of Occurrence	Threatened Fauna	Threatened Flora
Unlikely	Suitable habitat is absent from the study area and/or the study area is outside of the species known distribution	
Low	• The species has not been recorded in the locality (10km) within the last five years; and/or • Although suitable habitat is present in the study area the suitable habitat is in a highly modified, limited or degraded state; and/or • This species may be an occasional visitor, but habitat similar or of higher quality is widely distributed in the local area.	• The species has not been recorded in the locality (10km) within the last five years, and/or • Although suitable habitat is present in the study area the suitable habitat is in a highly modified or degraded state
Moderate	• The species has been recorded in the locality (10km) within the last five years; and/or • It is unlikely to be dependent on habitat within the study area (i.e., for breeding or important life cycle periods) or to maintain a permanent resident population. However, the species may seasonally, opportunistically or occasionally use resources within the study area; and/or • Although suitable habitat is present in the study area the suitable habitat is in a moderately modified, limited or degraded state This category includes fauna species that were targeted by seasonal surveys and were not recorded, wide ranging species which may fly-over' the site, regardless of the habitat types present and generalist species with non-specific habitat requirements	• The species has been recorded in the locality (10km) within the last five years; and/or. • Although potential habitat is present in the study area the suitable habitat is in a moderately modified or degraded state. This category includes flora species that were targeted by seasonal surveys and were not recorded.
High	• The species has been recorded in the locality (10km) within the last five years; and/or • It is highly likely that the species inhabits the study area and is dependent on identified suitable habitat (i.e., for breeding or important life cycle periods) and is likely to maintain a resident population. This includes species that are known to visit the study area during regular seasonal movements or migration.	• The species has been recorded in the locality (10km) within the last five years; and/or • It is highly likely to inhabit the study area and is dependent on identified suitable habitat.
Known	The species was observed in the study area during the current survey and/or was recorded during a survey conducted on the site during the last 5 years.	

Table 5.5: Habitat Assessment for Significant Species (Oceanic fauna have been removed from assessment).

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
FLORA					
Diuris tricolor Pine Donkey Orchid	V		No	Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include several sites west of Wagga Wagga, Dubbo in the Central West and Pilliga National in the north. The population in the Muswellbrook LGA is at the eastern limit of the geographic range of the species. Grows in sclerophyll forest among grass with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. Flowers from September to November.	**Low** Habitat for this orchid species was considered to occur within better quality areas of native ground cover.
**Prasophyllum* sp. Wybong A Leek Orchid		CE	Yes	Leek orchids are generally found in shrubby and grassy habitats in dry to wet soil (Jones 2006). Known to occur in open eucalypt woodland and grassland.	**Low** Marginal habitat was present. No nearby records.
**Euphrasia arguta*		CE	Yes	Historic records note habitats in the open forest country around Bathurst in sub humid places, on the grassy country near Bathurst, and in meadows near rivers.	**Unlikely** Suitable habitat was absent. No local records.
**Pterostylis gibbosa* Illawarra Greenhood	E1	E	No	All known sub-populations occur in open forest and woodland on flat or gently sloping land with poorly drained soils. Within the Hunter Valley this orchid species is confined to the Milbrodale area.	**Low** Marginal habitat was present. No nearby records.
**Dichanthium setosum* Blue Grass	V	V	No	Occurs on the New England Tablelands, Northwest Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. Associated with heavy basaltic black soils and red-brown loams with clay subsoil.	**Low** Marginal habitat was present. No nearby records.
**Cynanchum elegans* White-flowered Wax Plant	E1	E	No	This species occurs in scattered coastal localities from the QLD-NSW border south to Wollongong. Found in dry, littoral or subtropical rainforest, and occasionally in scrub and woodland from sea level to about 600m ASL.	**Unlikely** No suitable habitat was present.
**Prostanthera cineolifera* Singleton Mint Bush	V	V	No	Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal soils. Localities include Apseley Falls, east of Walcha; St Albans and the western side of Mangrove Creek Dam, near Bucketty; a site west of North Rothbury; Pokolbin State Forest (NSW Government, 2005) and Bellbird in the Hunter Valley (DECC NSW, 2008).	**Unlikely** No suitable habitat was present.
Vincetoxicum forsteri (Tylophora linearis)	V	E	No	Occurs from southern Queensland into central NSW, as far south near Temora with the majority of records occurring in the central western region. Grows in dry scrub and open forest.	**Low** Marginal habitat was present.
**Eucalyptus glaucina* Slaty Red Gum	V	V	No	Grows in grassy woodland and dry eucalypt forest, usually on deep, moderately fertile and well-watered soils. This species has only been recorded on the north coast of NSW and in small populations from Taree to Broke and west of Maitland.	**Low-Moderate** Suitable habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
**Picris evae* Hawkweed	V	V	No	Known in NSW north from the Inverell area, in the north-western slopes and plains regions. All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks.	**Low** Marginal habitat was present. No nearby records.
**Ozothamnus tesselatus*	V	V	No	Restricted to a few locations in an east-west zone south of Bunnan and between west Bylong and east Ravensworth. Grows in eucalypt woodland.	**Low** Marginal habitat was present. No nearby records.
**Pomaderris brunnea* Brown Pomaderris	E1	V	No	Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	**Unlikely** No suitable habitat was present.
**Swainsona murrayana* Slender Darling-pea, Slender Swainson, Murray Swainson-pea	V	V	No	Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree.	**Unlikely** No suitable habitat was present. No nearby records.
**Lepidium aschersonii* Spiny Peppercress	V	V	No	Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). Found on ridges of gilgai clays dominated by Brigalow (Acacia harpophylla), Belah (Casuarina cristata), Buloke (Allocasuarina luehmanii) and Grey Box (Eucalyptus microcarpa).	**Unlikely** No suitable habitat was present. No nearby records.
**Androcalva procumbens*	V	V	No	In sandy sites mainly confined to the Dubbo; -Mendooran; -and Gilgandra region, also in Pilliga and Nymagee areas.	**Unlikely** No suitable habitat was present.
**Thesium australe* Austral Toadflax	V	V	No	Grows in grassland or woodland, often in damp sites.	**Low** Marginal habitat was present. No nearby records.
FAUNA - AMPHIBIANS					
**Litoria booroolongensis* Booroolong Frog	E1	E	No	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Lives along permanent streams with some fringing vegetation cover such as ferns, sedges, or grasses. Adults occur on or near cobble banks and other rock structures within stream margins.	**Unlikely** No suitable habitat was present. No nearby records.
**Heleioporus australiacus* Giant Burrowing Frog	V	V	No	Banks of semi-permanent to ephemeral sand or rock-based streams and has also been identified in dams, drainage ditches and roadside culverts.	**Unlikely** No suitable habitat was present. No nearby records.
FAUNA - REPTILES					
**Aprasia parapulchella* Pink-tailed Worm-lizard	V	V	No	Is distributed along the western foothills of the Great Dividing Range between Bendigo in Victoria and Gunnedah in northern New South Wales. Generally, occupies sites with a grassy ground layer particularly those dominated by Kangaroo Grass with little or no leaf litter, and	**Low**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
				relatively low tree and shrub cover. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks.	Marginal habitat was present. Sites lacked rocky ground. No nearby records.
**Delma impar* Striped Legless Lizard	E	E	No	Occurs in the Southern Tablelands, the Southwest Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	**Low** Marginal habitat was present. No known nearby records.
FAUNA - BIRDS					
**Calidris ferruginea* Curlew Sandpiper	E1	CE & M	Yes	Tidal mudflats; saltmarsh; fresh, brackish or saline wetlands; sewage ponds.	**Unlikely** No suitable habitat was present.
**Rostratula australis* Australian Painted snipe	E1	E	No	Margins of swamps and streams, chiefly those covered with low and stunted vegetation.	**Unlikely** No suitable habitat was present.
**Melanodryas cucullata cucullata* South eastern Hooded Robin	E	E	No	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	**Low** Marginal habitat was present. No nearby records.
**Botaurus poiciloptilus* Australasian Bittern	E1	E	No	The Australasian Bittern lives alone or in loose groups and favours permanent fresh waters dominated by sedges, rushes, reeds or cutting grasses (e.g. Phragmites, Scirpus, Eleocharis, Juncus, Typha, Baumea and Gahnia) and feeds on insects, small fish, eels, frogs and other aquatic life, sometimes in rice fields.	**Unlikely** No suitable habitat was present.
**Calyptorhynchus lathami lathami* South eastern Glossy Black-Cockatoo	V		No	Lowland coastal forests, dense mountain forests, semi-arid woodland and trees bordering watercourses, with (Allo)Casuarina trees for foraging.	**Low** Marginal habitat was present. No foraging species were present.
**Callocephalon fimbriatum* Gang Gang Cockatoo	V	E	No	Tall montane forests and woodlands in mature wet sclerophyll forests. Requires hollows in which to breed between October and January.	**Moderate** Suitable foraging and nesting habitat were present for this species.
**Lathamus discolor* Swift Parrot	E1	CE	Yes	Open Forest to Woodland, also street trees and in parks and gardens, winter flowering eucalypts for feeding. This species nests in Tasmania during the summer months.	**Low - Medium** Seasonal foraging habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
**Neophema chrysostoma* Blue-winged Parrot	V	V	No	Found in western NSW. They favour grasslands and grassy woodlands. They are often found near wetlands both near the coast and in semi-arid zones. Blue-winged Parrots can also be seen in altered environments such as airfields, golf-courses and paddocks.	**Low** Suitable habitat was present. No nearby records
**Polytelis swainsonii* Superb Parrot	V	V	No	Found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Inhabit Box-Gum, Box-Cypress-pine and Boree woodlands and River Red Gum Forest.	**Low** Suitable habitat was present. No nearby records
Glossopsitta pusilla Little Lorikeet	V		No	Tall Open Forests, woodlands, orchards, parks and street trees.	**Moderate** Foraging and nesting habitat was present.
**Aphelocephala leucopsis* Southern Whiteface	V	V	No	Found in dry. sparse open forest/woodland and inland scrubs.	**Low** Suitable habitat was present. No nearby records
**Hirundapus caudacutus* White-throated Needletail		V & M	No	Inhabits the airspace above forests, woodlands, farmlands, plains, lakes, coasts and towns.	**Moderate** Due to the non-specific habitat requirements of this species habitat was considered to be present.
Ephippiorhynchus asiaticus Black-necked Stork	E1		No	Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia. Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are key habitat.	**Unlikely** No suitable habitat was present.
Circus assimilis Spotted Harrier	V		No	Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	**Low - Moderate** Suitable habitat was present.
Artamus cyanopterus cyanopterus Dusky Woodswallow	V		No	The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses.	**Moderate** Foraging and roosting habitat was present.
Petroica boodang Scarlet Robin	V		No	Primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. This species lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Habitat usually contains abundant logs and fallen timber and these are important components of its habitat.	**Moderate** Suitable habitat was present.
Petroica phoenicea Flame Robin	V		No	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Endemic to south-eastern Australia, and ranges from near the Queensland border to southeast South Australia and also in Tasmania.	**Low** Suitable habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
**Climacteris picumnus victoriae* Brown Treecreeper	V		No	This species is a medium sized insectivorous bird that occupies Eucalypt woodlands, particularly open woodlands lacking a dense understorey, River Red Gums on watercourses and around lakeshores. It is sedentary and nests in tree hollows within permanent territories.	**Moderate** Foraging habitat was present within areas containing remnant trees.
**Stagonopleura guttata* Diamond Firetail	V		No	Inhabits areas with a grassy, shrubby understorey including Eucalypt woodlands, forests, Acacia scrubs and mallee.	**Moderate** Suitable habitat was present.
Pomatostomus temporalis subsp. *temporalis* Grey-crowned Babbler	V		No	Open forest, woodland, scrubland, farmland and outer suburbs. Prefers woodlands with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs.	**Moderate** Suitable habitat was present.
Chthonicola sagittata Speckled Warbler	V		No	Speckled Warblers live in a wide range of eucalypt-dominated vegetation that has a grassy understorey, often on rocky ridges or in gullies. It builds a domed nest of grass, bark shreds and moss, lined with fur on the ground.	**Moderate** Suitable habitat was present.
**Anthochaera phrygia* Regent Honeyeater	E4A	CE	Yes	Temperate woodlands and open forest, including forest edges, preferring to forage on large-flowered Eucalypts.	**Low** Seasonal foraging habitat was present.
**Grantiella picta* Painted Honeyeater	V	V	No	Nomadic, within a range of generally drier forested areas with mistletoes.	**Low** Marginal habitat was present.
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	V		No	Usually found on the western side of the Great Dividing Range in dry sclerophyll forests and woodlands containing box-ironbark associations and River Red Gum. In the Hunter Valley this species is known to utilise drier coastal woodlands. Usually found in open woodlands.	**Low-Moderate** Suitable habitat was present.
Haematopus longirostris Pied Oystercatcher	E1		No	Distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria. Favours intertidal flats of inlets and bays, open beaches and sandbanks.	**Unlikely** No suitable habitat was present.
**Erythrotriorchis radiatus* Red Goshawk	E4A	V	Yes	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus Forest of coastal rivers.	**Unlikely** This species is unlikely to utilise the site.
Hieraaetus morphnoides Little Eagle	V		No	Is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	**Moderate** Suitable habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
**Falco hypoleucos* Grey Falcon	E1	V	No	Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Generally restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	**Low** Suitable habitat was present.
Falco subniger Black Falcon	V		No	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions.	**Moderate** Suitable habitat was present.
Ninox strenua Powerful Owl	V		No	Inhabits a wide range of vegetation types from wet Eucalypt forests with a Rainforest understorey to Dry Open Forests and Woodlands. The species has been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens. Powerful Owls nest in a slight depression in the wood-mould on the base of a cavity in a large old tree, sometimes in excess of 25 metres above the ground.	**Low - Moderate** Hunting and potential nesting habitat was present.
Tyto novaehollandiae Masked Owl	V		No	A range of wooded habitats that contain mature trees with large hollows for roosting and nesting, and more open areas for hunting.	**Low** Hunting and potential nesting habitat was present.
Tyto tenebricosa Sooty Owl	V		Yes	Prefers dense dimly lit forests, inhabiting pockets of rainforest and wet sclerophyll forest mainly in mountainous areas, often in south-east facing gullies.	**Unlikely** No suitable habitat was present.
FAUNA – MAMMALS					
**Dasyurus maculatus* ssp. *maculatus* Spotted-tailed Quoll	V	E	No	Inhabits sclerophyll forests, rainforests and coastal woodlands. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found nearby.	**Low** Only marginal habitat was present.
Phascogale tapoatafa Brush-tailed Phascogale	V		No	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter.	**Moderate** Suitable habitat was present
**Phascolarctos cinereus* Koala	E1	E	No	Coastal woodland and open forest containing suitable food trees.	**Low** Preferred Koala feed tree species were absent.
**Petrogale penicillata* Brush-tailed Rock-wallaby	E	V	Yes	Found in steep rocky sites in sclerophyll forests with a grassy understorey.	**Unlikely** No suitable habitat was present.
**Notamacropus parma* Parma Wallaby	V		No	Range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	**Unlikely** No suitable habitat was present.
**Petaurus australis* Yellow-bellied Glider	V		No	Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry	**Low**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
				escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	Only marginal habitat was present.
Petaurus norfolcensis Squirrel Glider	V		No	Dry sclerophyll forests and woodlands with exudates for foraging and hollows for nesting.	**Low-Moderate** Suitable habitat was present.
**Petauroides volans* Greater Glider	E	E	No	Eucalypt-dominated low open forests on the coast to tall forests in the ranges and low woodland west of Great Dividing Range. Not found within rainforests.	**Unlikely** No preferred habitat was present.
Pteropus poliocephalus Grey-headed Flying-Fox	V	V	No	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	**Moderate-High** Seasonal foraging habitat was available in the form of flowering myrtaceous canopy species.
**Pseudomys novaehollandiae* New Holland Mouse		V	No	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	**Unlikely** No suitable habitat was present for this species.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V		No	Has been reported from a wide variety of habitats. Roosts in tree hollows, animal burrows, dry clay cracks, under rock slabs and in abandoned Sugar Glider nests.	**Low-Moderate** Suitable hunting and roosting habitat were present.
Micronomus norfolkensis Eastern Freetail-bat	V		No	Appears to live in sclerophyll forests and woodland. Roosts in tree hollows or under loose bark.	**Moderate** Suitable hunting and roosting habitat were available.
Falsistrellus tasmaniensis Eastern False Pipistrelle	V		No	Inhabits sclerophyll forests and has been observed roosting in holes and hollow trunks of Eucalypts.	**Moderate** Suitable hunting habitat was available.
Miniopterus australis Little Bentwing-bat	V		Yes	Tropical rainforest to warm-temperate wet and dry sclerophyll forest; caves or similar structures for roosting.	**Moderate** Suitable hunting habitat was present. Preferred roosting habitat was absent.
Miniopterus orianae oceanensis Large Bentwing-bat	V		No	Wet and dry tall open forest, rainforest, monsoon forest, open woodland, paperbark forests and open grasslands, caves or similar structures for roosting. It occasionally uses tree hollows.	**Low-Moderate** Suitable foraging habitat was present. Preferred roosting habitat in the form of caves was absent.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
Myotis macropus Southern Myotis	V		No	Various habitats of the coast and adjacent ranges with suitable waterbodies for hunting; caves or similar structures for roosting. It occasionally uses tree hollows.	**Low** No waterbodies within the impact footprint were present for hunting. Preferred roosting habitat in the form of caves and similar structures was absent.
**Nyctophilus corbeni* Corben's Long-eared Bat	V	V	No	Inhabits a variety of vegetation types, including mallee, bull oak Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	**Moderate** Suitable hunting and roosting habitat were available.
Scoteanax rueppellii Greater Broad-nosed Bat	V		No	Tree-lined creeks, woodland/clearing ecotones and rainforest creeks, roosting mainly in tree hollows.	**Moderate** Suitable foraging and roosting habitat were present.
**Chalinolobus dwyeri* Large-eared Pied Bat	V	V	Yes	Occupies dry sclerophyll forest and woodland. Roosts in caves, abandoned mud-nests of Fairy Martins and mine tunnels.	**Low** Suitable foraging habitat was present. Preferred roosting habitat was absent.
Vespadelus troughtoni Eastern Cave Bat	V		Yes	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	**Low** No preferred roosting habitat was available within the site.

5.4 FAUNA APPRASIAL RESULTS

5.4.1 DIURNAL SURVEYS

Amphibians

During surveys the amphibian species *Limnodynastes tasmaniensis* (Spotted Marsh Frog) was heard calling from a small dam in the south beside the access road between the BESS Sites.

No amphibian species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land.

Reptile Survey

No reptile species were observed during surveys.

Avifauna

It was noted that few avifauna species were observed or heard during surveys. Species observed within the study area included:

- *Grallina cyanoleuca* (Magpie-lark);
- *Pardalotus striatus* (Striated Pardelote)
- *Rhipidura leucophrys* (Willie Wagtail)
- *Eurystomus orientalis* (Dollarbird)
- *Philemon corniculatus* (Noisy Friarbird)
- *Platycercus eximius* (Eastern Rosella)
- *Falco cenchroides* (Australian Kestrel)
- *Eolophus roseicapilla* (Galah)
- *Coracina novaehollandiae* (Black-faced Cuckoo Shrike)
- *Cacatua galerita* (Sulphur-crested Cockatoo)
- *Psephotus haematonotus* (Red-rumped Parrot)
- *Sturnus vulgaris* (Common Starling)

One specimen of *Tachybaptus novaehollandiae* (Australasian Grebe) was recorded within the dam beside the existing access road between the BESS Sites.

No avifauna species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within or adjacent to the subject land.

Mammal Survey

No native mammal species were directly observed during diurnal fieldwork. Scats consistent with the introduced *Vulpes vulpes* (Red Fox) were observed within the study area. A deceased introduced *Oryctolagus cuniculus* (European Rabbit) and diggings consistent with this species were also noted. A number of rabbit burrows were present directly north of Tree No. 12.

No mammal species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded on site. Both mammal species observed within the subject land are listed as Key Threatening Processes under the BC Act 2016 and have been addressed in Section 7 of this report.

5.5 SURVEY LIMITATIONS

As with all reports of this type the main survey limitation is considered to be the very short period of time in which the fieldwork was carried out. Limitations to the likelihood of detecting certain subject species were also encountered during this survey. Such limitations were generally related to the seasonal occurrence of species, be it as a result of known flowering periods for flora or migratory movements by fauna.

These limitations have been overcome by applying the precautionary principle in all cases where the survey methodology may have given a false negative result. This precautionary principle was achieved by recognising that most threatened species are rare and therefore unlikely to be encountered during a survey even if they may utilise the site at other times. These species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

6.0 IMPACT ASSESSMENT

6.1 AVOIDANCE AND MINIMISATION OF IMPACTS

Impact on vegetation has been minimised by positioning the BESS and associated APZ and access road within an area of the subject land that contained disturbance from historic vegetation removal and current livestock grazing. A large portion of the access road is a pre-existing access road that will require widening.

6.2 DIRECT IMPACT

The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 0.76ha of PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland intergrade;
- Removal of up to 0.76ha of highly disturbed example of the State listed EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions;
- Removal of up to 0.33ha of highly disturbed example of the Nationally listed CEEC Central Hunter Valley Eucalypt Forest and Woodland;
- Removal of up to four hollow-bearing trees, with the definite removal of one hollow-bearing tree, and likely removal of an additional three hollow-bearing trees. Branch trimming of three hollow-bearing trees may also be required as a result of the proposal;
- Removal of known habitat for a number of the addressed threatened species.

6.3 INDIRECT IMPACTS

The proposal may result in the following indirect and potential impacts:

- Erosion and sedimentation;
- Increased spread of priority and other weed species;
- Edge effects.
- Other impacts on biodiversity values.

6.4 MITIGATION MEASURES

Mitigation measures have been specified to minimise the impact of the vegetation clearance to protect biodiversity values. The measures will include:

<u>NSW BC Act 2016 Endangered Ecological Community (EEC) Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions and Nationally Listed EPBC Act 1999 Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland</u>

Approximately 0.76ha of the State listed EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions and approximately 0.33ha of the Nationally listed CEEC Central Hunter Valley Eucalypt Forest and Woodland will require removal as a result of the proposal. Clearance is to be restricted to the impact area for the proposal, with the impact area clearly defined. Where possible, as much of this EEC should be retained within the scope of the proposal, with propriety given to retaining canopy specimens within the scope of the proposal. It is recommended that

weed control as part of property management is undertaken within the retained TECs within the subject land. No stockpiling of building materials is to occur outside of the impact area to avoid impact to the retained TECs.

Trees and other Native Vegetation

Where possible, works should minimise any impact to native vegetation outside the scope of the proposal, including avoiding the critical root zone of remnant trees when trenching cables and constructing roadways. Where unavoidable, works should minimise impacts to trees as follows:

- The clearance boundary is to be clearly marked with flagging tape;
- trees to be removed or trimmed are to be clearly marked to prevent any unintentional impact on trees that are to remain untouched;
- the clearing or trimming of any trees should be undertaken in a manner that avoids damaging adjacent vegetation;
- all material stockpiles, vehicle parking and machinery storage will be located within cleared areas proposed for clearing, and not in areas of native vegetation that are to be retained.

Hollow-bearing Trees

- Wherever possible, works should avoid impacts to hollow-bearing trees;
- Nest boxes are to be installed into retained trees at a ratio of two nest boxes per hollow-bearing tree. The nest boxes are to be installed prior to tree clearance within retained trees;
- Artificial nest boxes should be installed onto a tree in the nearest adjacent area of similar habitat by a suitably qualified ecologist.
- The removal of hollow-bearing trees should be supervised by a suitably qualified ecologist to reduce the impact on any fauna which may be present.

Weeds

All machinery and equipment are to be inspected for weeds and weed propagules prior to going on site to prevent the introduction of new weed species to the area. It is recommended that all Priority Weeds within the subject land be controlled as part of routine property maintenance. Particular attention should be given to the weeds listed in Table 5.4 of this report.

7.0 CONSIDERATIONS UNDER SECTION 7.3 OF THE BC ACT 2016

Considerations of the effects of the vegetation removal undertaken for the proposed development under *Section 7.3* of the BC Act (2016) for the concerned threatened species is given below. The species dealt with are those identified during the fieldwork and those identified as having potential habitat available on site in Table 4.3.

A detailed assessment for each BC Act 2016 listed threatened species located within the study area is undertaken in Appendix C.

For the purposes of the Section 7.3 of the BC Act (2016), the following factors have been taken into account in deciding whether there is likely to be a significant effect on this threatened species, populations or ecological communities, or their habitats:

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Threatened Flora

No threatened flora species were recorded within the subject land during fieldwork. Of the 16 flora species assessed, the subject land was found to contain suitable habitat for 6 of the addressed species:

- *Diuris tricolor (*Pine Donkey Orchid)
- *Vincetoxicum forsteri (Tylophora linearis)*
- *Eucalyptus glaucina* (Slaty Red Gum)
- *Picris evae* (Hawkweed)
- *Ozothamnus tesselatus*
- *Thesium australe* (Austral Toadflax)

Of these addressed threatened flora species the most likely to occur within the subject land area would include *Eucalyptus glaucina* (Slaty Red Gum). The proposal may result in an incremental loss of habitat for these threatened flora species; however, it is considered not likely that the proposal would significantly affect the life cycle of any of these threatened flora species or place any viable local populations of at risk of extinction.

Threatened Fauna

No threatened species were recorded in the study area during surveys. Of the 55 addressed threatened fauna species the subject site was considered to contain suitable habitat for 41 species:

- *Aprasia parapulchella* *Pink-tailed Worm-lizard*
- *Delma impar* *Striped Legless Lizard*
- *Melanodryas cucullata cucullata* Hooded Robin (south-eastern form)
- *Calyptorhynchus lathami* Glossy Black-Cockatoo
- *Callocephalon fimbriatum* Gang Gang Cockatoo
- *Lathamus discolor* Swift Parrot
- *Neophema chrysostoma* Blue-winged Parrot
- *Polytelis swainsonii* Superb Parrot
- *Glossopsitta pusilla* Little Lorikeet
- *Apheloceph*ala *leucopsis* Southern Whiteface
- *Circus assimilis* Spotted Harrier
- *Artamus cyanopterus cyanopterus* Dusky Woodswallow
- *Petroica boodang* Scarlet Robin
- *Petroica phoenicea* Flame Robin
- *Climacteris picumnus victoriae* Brown Treecreeper
- *Stagonopleura guttata* Diamond Firetail
- *Pomatostomus temporalis subsp. temporalis* Grey-crowned Babbler
- *Chthonicola sagittata* Speckled Warbler
- *Anthochaera phrygia* Regent Honeyeater
- *Grantiella picta* Painted Honeyeater
- *Melithreptus gularis gularis* Black-chinned Honeyeater
- *Hieraaetus morphnoides* Little Eagle
- *Falco subniger* Black Falcon
- *Ninox strenua* Powerful Owl
- *Tyto novaehollandiae* Masked Owl
- *Dasyurus maculatus ssp. maculatus* Spotted-tailed Quoll
- *Phascogale tapoatafa* Brush-tailed Phascogale
- *Phascolarctos cinereus* Koala
- *Petaurus australis* Yellow-bellied Glider
- *Petaurus norfolcensis* Squirrel Glider
- *Pteropus poliocephalus* Grey-headed Flying-Fox
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Micronomus norfolkensis* Eastern Coastal Free-tailed Bat
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Miniopterus australis* Little Bentwing-bat
- *Miniopterus orianae oceanensis* Large Bentwing-bat
- *Myotis macropus* Southern Myotis
- *Nyctophilus corbeni* Corben's Long-eared Bat
- *Scoteanax rueppellii* Greater Broad-nosed Bat
- *Chalinolobus dwyeri* Large Pied Bat
- *Vespadelus troughtoni* Eastern Cave Bat

Of these remaining threatened fauna species those most likely to utilise the site would include a number of the woodland birds, Brush-tailed Phascogale, Squirrel Glider, Grey-headed Flying-Fox and microchiropteran bats. The proposal will result in a small incremental reduction habitat for the above species. Given the small impact it is unlikely that the proposal will have a significant impact on these threatened fauna species such that a local extinction would occur.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Native vegetation occurring within the subject land was found to be consistent which that of the BC Act listed EEC – Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions. This EEC is tenuously connected to a larger remnant area of similar vegetation to the east of the subject land. As a result of the proposal, an area of approximately 0.76ha of highly disturbed Central Hunter Grey Box – Ironbark Woodland will be removed, which includes the removal of up to 4 trees (1 tree certain to be removed and up to 3 trees (including one dead tree) are likely to require removal) for the installation of the 11kv Cable that will connect the north-east BESS sites to the north-east corner of the lot and the branch trimming of an additional 3 trees. Given the positioning of the impact area within the most disturbed areas of vegetation within the subject land and the retention of trees outside of the scope of the proposal, the proposed BESS installation and associated infrastructure is unlikely to have a significant impact on areas identified as Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions such that the local occurrence is likely to be placed at risk of extinction.

c) *In relation to the habitat of a threatened species or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 0.76ha of PCT 3431 Central Hunter Ironbark Grassy Woodland & PCT 3397 Northwest Flats Yellow Box Woodland intergrade;
- Removal of up to 0.76ha of highly disturbed example of the State listed EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions;
- Removal of up to 0.33ha of highly disturbed example of the Nationally listed CEEC Central Hunter Valley Eucalypt Forest and Woodland;
- Removal of up to four hollow-bearing trees, with the definite removal of one hollow-bearing tree, and likely removal of an additional three hollow-bearing trees. Branch trimming of three hollow-bearing trees may also be required as a result of the proposal;
- Removal of known habitat for a number of the addressed threatened species.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No areas of habitat are likely to become significantly fragmented or isolated from others areas of habitat as a result of the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

The proposed development will result in the removal of up to 4 trees which all contain hollows. This will result in the loss of a small amount of habitat for those threatened species with potential habitat on site, particularly hollow-dependent species. Areas of habitat to be removed are important due to the potential habitat of varying quality for 41 addressed threatened species. However, taking the recommendations into consideration, no area of habitat important to the long-term survival of these species and ecological communities will be significantly impacted.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

No areas of outstanding biodiversity value are within the study area.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The 'Key Threatening Processes' currently listed under Schedule 4 of the BC Act 2016 that are relevant to the study area have been listed in Table 7.1.

Table 7.1: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the subject land
Clearing of Native Vegetation.	The proposal will result in the removal of native vegetation and may be viewed as being part of this Key Threatening Process. However, the action is unlikely to be responsible for the significant loss of any TEC, endangered population or threatened species provided that recommendations for impact minimisation as listed within Section 6.4 are undertaken.
Loss of Hollow-bearing Trees	UP to four hollow-bearing trees could potentially require removal as a result of the proposed development. Nest boxes are to be installed into retained trees at a ratio of two nest boxes per hollow-bearing tree. The nest boxes are to be installed prior to tree clearance within retained trees. The artificial nest boxes should be installed onto a tree in the nearest adjacent area of similar habitat by a suitably qualified ecologist. This mitigation measure will ensure that no net loss of hollows will result from the proposed development.
Removal of dead wood and dead trees	Any dead wood or dead trees requiring removal for the proposal is to be moved into retained vegetation outside of the impact area to provide ground habitat.
Invasion of native plant communities by exotic perennial grasses.	Exotic grasses such as *Pennisetum clandestinum* (Kikuyu) were present within the road reserve of the subject land. The

Key Threatening Process	Applicability in regards to the subject land
	proposal has the potential to result in an increase in invasion by exotic perennial grasses.
Reduced viability of adjacent habitat due to edge effects	The proposed development will not result in a significant increase in edge effects impacting upon the retained vegetation. The majority of the site has been historically disturbed and as such edge effects have been an ongoing impact to the retained vegetation within the study area.
Predation by the *Felis catus* (Feral Cat)	The Feral Cat was not recorded on site at the time of the survey however this species would be considered to have an impact on native fauna in the local area. The proposal is not likely to result in an increase in feral numbers of this introduced species.
Predation by the *Vulpes vulpes* (Red Fox)	Evidence of the Red Fox was recorded during surveys within the subject land and this species would be considered to have an impact on native fauna in the local area. The proposal is not likely to result in an increase in numbers of this introduced species.
Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)	Noisy miners were not recorded within the study area; however, the proposal is unlikely to increase the impacts associated with this species.
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	It is unknown what impact fire has had within the subject land.
Invasion, establishment and spread of Lantana (*Lantana camara*)	Lantana was not recorded within the subject land. If this species is located within subject land, it is recommended that this weed be controlled as part of routine property maintenance.
Competition and grazing by the feral European rabbit	Scats associated with the European rabbit and a deceased specimen were observed within the study area. The proposal is not likely to result in an increase in feral numbers of this introduced species.
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species	No evidence of the disease was observed on psittacine species.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis.	No evidence of chytrid was observed during site visits.
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae.	No evidence of the fungi was observed during site visits.
Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata*	African Olive was not observed within the study area; however, any occurrences of this weed should be managed as part of routine property maintenance.

8.0 CONSIDERATIONS UNDER STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY AND CONSERVATION) 2021

8.1 CHAPTER 3 KOALA HABITAT PROTECTION 2020

The principal aim of this Chapter aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population.

Chapter 3 applies to land that the Chapter 4 does not apply to as defined in Schedule 2 of SEPP (Biodiversity Conservation) 2021. This includes land zoned as RU1 in the Muswellbrook Shire Council LGA. This Chapter applies to areas of more than one hectare or an area, which has together with any adjoining land in the same ownership an area of more than 1 hectare, whether or not the development application applies to the whole, or only part of the land. The subject land constitutes an area over 1ha therefore Chapter 3. In addressing this Chapter there are two questions to be considered.

8.1.1 FIRST CONSIDERATION - IS THE LAND 'POTENTIAL KOALA HABITAT'?

'Potential Koala Habitat' is defined in Chapter 3 as, "...an area of native vegetation where trees of the type listed in Schedule 1 (Koala feed tree species) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component".

No species of 'Koala Feed Tree' were recorded in the study area. There is no "Potential Koala Habitat" present in this area therefore no further consideration is required.

9.0 ASSESSMENT OF SERIOUS AND IRREVERSIBLE IMPACTS

Under the BC Act 2016, a determination of whether an impact is serious and irreversible (SAII) must be made in accordance with the principles prescribed in section 6.7 of the BC Regulation.

The "*Guidance to assist a decision maker to determine a serious and irreversible impact*, 2017, sets out those potential SAII species and ecological communities (known as "potential SAII entities").

The principles for determining serious and irreversible impacts in the Biodiversity Conservation Regulation, 2017 are:

- *will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or*
- *will further reduce the population of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or*
- *are impacts on the habitat of a species or area of ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or*
- *are impacts on a species or ecological community is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.*

9.1 POTENTIAL SAII ENTITIES

In this case all potential SAII entities are derived from Appendix 2 of the Guide, and are within the BioNet search area (DPE, 2023). The approval authority must take those impacts into consideration and determine whether there are any additional and appropriate measures that will minimise those impacts if approval is to be granted. An Impact evaluation is shown in Table 9.1. Entities include:

- *Prasophyllum* sp. Wybong (A Leek Orchid);
- *Euphrasia arguta* (Eyebright)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Lathamus discolor* (Swift Parrot);
- *Anthochaera phrygia* (Regent Honeyeater);
- *Erythrotriorchis radiates* (Red Goshawk);
- *Tyto tenebricosa* (Sooty Owl);
- *Petrogale penicillata* (Brush-tailed Rock-wallaby)
- *Miniopterus australis* (Little Bentwing-bat);
- *Chalinolobus dwyeri* (Large Pied Bat);
- *Vespadelus troughtoni* (Eastern Cave Bat).

Table 9.1: SAII impact evaluation

Potential SAII Entities	Impact Evaluation	Impact Thresholds	Serious and Irreversible Impact?
Prasophyllum sp. Wybong A Leek Orchid	Marginal habitat was present. No nearby records.		No
Euphrasia arguta Eyebright	No habitat was considered present		No
Calidris ferruginea Curlew Sandpiper	No habitat was considered present		No
Lathamus discolor Swift Parrot	Seasonal foraging habitat was present.	Not within a mapped BAM Important Area (DPE, 2023	No
Anthochaera phrygia Regent Honeyeater	Seasonal foraging habitat was present.	Not within a mapped BAM Important Area (DPE, 2023)	No
Erythrotriorchis radiatus Red Goshawk	No habitat was considered present		No
Tyto tenebricosa Sooty Owl	No habitat was considered present		
Petrogale penicillata Brush-tailed Rock-wallaby	No habitat was considered present		No
Miniopterus australis Little Bentwing-bat	Species recorded within the study area. Suitable habitat was present. Preferred roosting habitat was absent.		No
Chalinolobus dwyeri Large Pied Bat	Suitable hunting habitat was present. Preferred roosting habitat was absent.		No
Vespadelus troughtoni Eastern Cave Bat	No preferred roosting habitat was available within the site.		No

9.2 ADDITIONAL IMPACT ASSESSMENT PROVISIONS FOR THREATENED SPECIES AT RISK OF AN SAII

No threatened matter consistent with a SAII candidate species identified as likely to occur or to contain significant habitat within the study area is likely to be significantly impacted by the proposed development.

10.0CONSIDERATIONS UNDER THE COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Assessments have been made to determine whether or not the proposal or activity has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. The matters of National Environmental Significance and the appropriate responses are listed below:

- *World Heritage properties;*

The site is not likely to have a significant impact to any World Heritage Properties.

- *wetlands recognised under the Ramsar convention as having international significance;*

The subject site is 50 - 100km upstream of the Hunter Estuary Ramsar Wetland. The proposed works is not likely to have a significant impact to any Ramsar Wetlands.

- *listed threatened species and communities;*

Threatened Communities

Ten nationally threatened ecological communities were recorded on the DCCEEW database as having potential to occur within 10km of the site, these being:

- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- Lowland Rainforest of Subtropical Australia
- Central Hunter Valley eucalypt forest and woodland
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland
- Weeping Myall Woodlands
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Hunter Valley Weeping Myall (Acacia pendula) Woodland
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions

Taking into consideration the diagnostic characters listed below this community would likely fit the criteria of the nationally Critically Endangered Ecological Community (CEEC); Central Hunter Valley eucalypt forest and woodland. The key diagnostic characteristics of this ecological community are:

- It is limited to the Sydney Basin (SYB) and the NSW North Coast (NNC) IBRA7 bioregions in New South Wales.

- It is limited to the Hunter River catchment (typically called the Hunter Valley region).
- It mostly occurs within the Hunter Valley IBRA subregion (SYB02) of the Sydney Basin Bioregion.
- It typically occurs on lower hillslopes and low ridges or valley floors in undulating country, mostly on Permian sedimentary soils.
- It is woodland or forest, with projected cover of canopy trees of 10% or more.
- The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *E. dawsonii* (Slaty Gum) and *E. moluccana* (Grey Box).
- Under certain circumstances a fifth species, *Allocasuarina luehmannii* (Bulloak), may dominate (or be part of the mix of dominants above) in sites previously dominated by one or more of the above four eucalypt species;
- A number of other tree species may be sub-dominant (or locally dominant within a patch). These include *Angophora floribunda* (Rough Barked apple), *Eucalyptus blakelyi* (Blakely's Red Gum), *E. glaucina* (slaty red gum) and *E. tereticornis* (Forest Red Gum)
- Hybrids of these eucalypt species may be present (and contribute to levels of dominance) and are included in this definition of the ecological community.
- A ground layer is present (although it may vary in development and composition), as a sparse to thick layer of native grasses, other herbs and/or low shrubs;
- • Three tree species: forest oak (*Allocasuarina torulosa*)—also known as forest sheoak, rose oak or rose she-oak; white mahogany (*Eucalyptus acmenoides*); and red ironbark (*Eucalyptus fibrosa*)—also referred to as broad-leaved ironbark, are all largely absent from the canopy of a patch (i.e., no more than two trees per hectare, on average across a patch—of each of the three species).

This CEEC was subject to disturbances, particularly past vegetation removal and livestock grazing Under the National Legislation (EPBC Act 1999), Approved Conservation Advice for Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland (DoEE 2016), derived native grassland and shrublands are not included in the Critically Endangered Community Central Hunter Valley Eucalypt Forest and Woodland CEEC. The exceptions are where there is a gap, in or at the edge of a patch; or connecting two patches across a short distance (i.e., 30 metres). No trees (canopy species) were present within BESS Site 1 and therefore was not found to be consistent with this CEEC. A number of older remnant tree species were present on the edges of BESS site 2 & 3. At least one of these trees (Tree No. 12) will be required to be removed. The majority of this CEEC within both impact areas consisted largely of derived grassland which was subject to ongoing grazing and weed incursion. The proposal will impact 0.33ha of this TECs, including the removal of one canopy specimen and potentially the removal of an additional 3 canopy specimens. Considering the BESS impact areas are largely centred on areas of derived grassland, the proposal will result in a small

incremental reduction of this CEEC with the proposed removal of up to 4 canopy trees in the local area, however taking the recommendations given in this report to enhance this CEEC within the site such as weed control the proposal is unlikely to require referral.

Forty-six nationally threatened species were recorded on the DCCEEW database as occurring or having potential habitat available within 10km of the site (note all pelagic species and ocean-going birds which do not complete part of their life cycles on mainland NSW were excluded from the search), these being:

Anthochaera phrygia	Regent Honeyeater
Aphelocephala leucopsis	Southern Whiteface
Botaurus poiciloptilus	Australasian Bittern
Calidris ferruginea	Curlew Sandpiper
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)
Erythrotriorchis radiatus	Red Goshawk
Falco hypoleucos	Grey Falcon
Grantiella picta	Painted Honeyeater
Hirundapus caudacutus	White-throated Needletail
Lathamus discolor	Swift Parrot
Melanodryas cucullata cucullata	Hooded Robin (south-eastern)
Neophema chrysostoma	Blue-winged Parrot
Polytelis swainsonii	Superb Parrot
Rostratula australis	Australian Painted Snipe
Stagonopleura guttata	Diamond Firetail
Heleioporus australiacus	Giant Burrowing Frog
Litoria booroolongensis	Booroolong Frog
Aprasia parapulchella	Pink-tailed Worm-lizard
Delma impar	Striped Legless Lizard
Chalinolobus dwyeri	Large-eared Pied Bat
Dasyurus maculatus maculatus	Spot-tailed Quoll
Notamacropus parma	Parma Wallaby
Nyctophilus corbeni	Corben's Long-eared Bat
Petauroides volans	Greater Glider (southern and central)
Petaurus australis australis	Yellow-bellied Glider (south-eastern)
Petrogale penicillata	Brush-tailed Rock-wallaby
Phascolarctos cinereus	Koala
Pseudomys novaehollandiae	New Holland Mouse
Pteropus poliocephalus	Grey-headed Flying-fox
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid
Euphrasia arguta	
Cynanchum elegans	White-flowered Wax Plant
Pterostylis gibbosa	Illawarra Greenhood
Vincetoxicum forsteri	
Eucalyptus glaucina	Slaty Red Gum
Prostanthera cineolifera	
Picris evae	Hawkweed
Ozothamnus tesselatus	
Dichanthium setosum	bluegrass
Swainsona murrayana	Slender Darling-pea
Lepidium aschersonii	Spiny Peppercress
Pomaderris brunnea	Rufous Pomaderris
Androcalva procumbens	
Thesium australe	Austral Toadflax

No nationally threatened species were recorded on site during surveys. Habitat of varying quality was considered to be available for those mobile threatened species such as woodland birds, megachiropteran bats and microchiropteran bats. The action will result in an incremental loss/modification of habitat within the locality for these species. The removal of trees as a result of the proposal will also result in an incremental reduction of seasonal foraging habitat for the majority of birds listed above, as well as the Grey-headed Flying Fox. The proposal will result in an incremental loss of foraging and roosting/nesting habitat for these species in the local area, however it is not likely to have a significant impact on any of these species.

- *migratory species protected under international agreements;*

Twelve nationally listed migratory species were recorded on the DCCEEW on-line database as occurring or having potential habitat available within 10km of the subject land, these being:

Migratory Terrestrial Species:

- *Hirundapus caudacutus* (White-throated Needletail)
- *Monarcha melanopsis* (Black-faced Monarch)
- *Motacilla flava* (Yellow Wagtail)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Rhipidura rufifrons* (Rufous Fantail)

Migratory Wetland Species:

- *Actitis hypoleucos* (Common Sandpiper)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris melanotos* (Pectoral Sandpiper)
- *Gallinago hardwickii* (Latham's Snipe)
- *Tringa nebularia* (Common Greenshank)

Migratory Marine Birds

- *Apus pacificus* (Fork-tailed Swift)

Considering the relatively small impact on habitat in the locality it is unlikely that these species or any of the listed migratory species would be significantly affected by the proposal.

- *nuclear activities;*

The proposal does not involve any type of nuclear activity.

- *the Commonwealth marine environment;*

The proposal does not involve the modification of the Commonwealth marine environment.

11.0CONCLUSION

In conclusion, installing a Battery Energy Storage System (BESS) and associated infrastructure and Bushfire requirements at 981 New England Highway, Aberdeen will result in an incremental reduction of remnant habitat, within the subject land and local area, however, is unlikely to have a significant impact on any addressed threatened species, endangered populations or threatened ecological communities considered within this report.

12.0BIBLIOGRAPHY

Bell SAJ, Rockley C, Llewellyn A. (2019). Flora of the Hunter Region, Endemic Trees and Larger Shrubs. March 2019. CSIRO Publishing.

Churchill, S. (2008). Australian Bats (2nd edn). Allen & Unwin Australia.

Cogger, H.G. (2014). Reptiles and Amphibians of Australia (7th edn.). CSIRO Publishing.

Cropper, S. (1993). *Management of Endangered Plants.* CSIRO Publications, East Melbourne.

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2023a). EPBC Act Protected Matters Report for a 10 Kilometre radius search from the centre of the subject land. Department of the Environment, Commonwealth of Australia. Accessed via, https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl >.

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2022b). *Commonwealth species profiles and threats database (SPRAT*). Department of the Environment, Commonwealth of Australia.

DAWE (Department of Agriculture, Water and the Environment) (2016). Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions). Accessed via <https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-regions />

DoE (Department of the Environment) (2013). *Matters of National Significance. Significant Impact Guidelines 1.1* Environment Protection and Biodiversity Conservation Act 1999.

DPE (Department of Planning and Environment), (2023a). BioNet Atlas NSW Wildlife Database selected area. (Data extracted 2 November 2023).

DPE (Department of Planning and Environment), (2023b). NSW Biodiversity Values Map accessed via <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>.

DPE (Department of Planning and Environment), (2023c) BioNet vegetation classification database. Accessed via < http://www.environment.nsw.gov.au/research/Visclassification.htm>

DPE (Department of Planning and Environment), (2023d). Profiles of threatened species, population, and ecological communities. Accessed via <http://www.environment.nsw.gov.au/threatenedspeciesapp/>

DPIE (Department of Planning, Industry and Environment), (2011). *Soil and Land Resources of the Hunter Region, version 1.5, NSW Department of Planning, Industry and Environment, Parramatta.*

DPIE (Department of Planning, Industry and Environment) (2017) BioNet NSW (Mitchell) Landscapes – Version 3.1 accessed via < https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1>.

DPIE (2023). Department of Planning, Industry and Environment, 2020, Soil and Land Resources of the Hunter Region, version 1.5, NSW Department of Planning, Industry and Environment, Parramatta.

Harden, G (1991-2000). *Flora of New South Wales*. Vols 1-4. NSW University Press.

Hunter Valley Bushfire Consulting Services (2023). Bushfire Assessment Report (BAR) – proposed Battery Energy Storage System, Buildings of Class 5 to 8 (PBP, 2019, Part 8 – Other Development) 981 New England Highway, Aberdeen NSW.

Kovac, M. and Lawrie, J.W. (1991). Soil Landscapes of the Singleton 1:250 000 Sheet. Soil Conservation. Service of NSW, Sydney.

Landcom (2004). *Managing Urban Stormwater: Soils and Construction.* National Library of Australia, Canberra, Australia

Leonard, G. (2007). *Eucalypts: A Bushwalker's Guide. Second Edition* New South Wales University Press, Sydney.
LPI (Land and Property Information NSW), (2023). NSW Imagery Web Services.

Nearmap (2023) Aerial image of the subject land.

NSW Government (2018) *Australia's IBRA Bioregions and sub-bioregions*. Accessed via <https://www.seed.nsw.gov.au/> (Data extracted 2 November 2023).

NSW Government (2023). NSW SEED Mapping. Accessed via <https://www.seed.nsw.gov.au/>

OEH (Office of Environment and Heritage) (2018). *Threatened Species Test of Significance Guidelines.* State of New South Wales and Office of Environment and Heritage 2019.

Pizzey, G. & Knight, F. (2012). The field guide to the birds of Australia. (9th edn). HarperCollins Publishers, Australia.

PlantNET (The NSW Plant Information Network System) (2023) *Royal Botanic Gardens and Domain Trust, Sydney.* http://plantnet.rbgsyd.nsw.gov.au.

Robinson, L. (2003). *Field Guide to the Native Plants of Sydney*. 3rd edn. Kangaroo Press Pty. Ltd., New South Wales.

Triggs, B. (1996). *Mammal Tracks and Signs-A Field Guide for South-eastern Australia.* Oxford University Press, Melbourne.

Van Dyck, S. & Strahan, R. (Ed) (2008). *The Mammals of Australia*. 3rd edn. New Holland Publishers, Australia.

APPENDIX A

TOTAL FLORA LIST

Introduced species are indicated by an asterisk ("*").

The following standard abbreviations are used to indicate subspecific taxa:

subsp. subspecies
var.- variety
× - hybrid between the two indicated species

Threatened Species - NSW Biodiversity Conservation Act 2016 (BC Act)

V Vulnerable
E1 Endangered
E2 Endangered Population
E4A Critically Endangered Population

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

V Vulnerable
E Endangered
CE Critically Endangered

Serious and Irreversible Impact SAII

Regional Significance (Hunter Rare Plants Database – Version 1 2003)

L endemic to Hunter Region
DA disjunct in the Hunter Region, rare or localized (aggregated)
DB disjunct in the Hunter Region, widespread and uncommon (broad)
R rare but extends beyond the Hunter Region
U everywhere uncommon
N at northern distributional limit in the Hunter
E at eastern distributional limit in the Hunter
S at southern distributional limited in the Hunter
W at western distributional limited in the Hunter
T may be threatened in the Hunter Region
S Probably secure in the Hunter Region

Weeds

Priorities under the Biosecurity Act 2015

G General Biosecurity Duty - any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).
P Prohibition on dealings - Must not be imported into the State or sold.
R Regional Recommended Measure - Land managers mitigate the risk of the plant being introduced to their land. Land managers reduce impacts from the plant on priority assets. Land managers prevent spread from their land where feasible. The plant or parts of the plant are not traded, carried, grown or released into the environment.

NSW BC Act 2016

T Listed as a Threatening Process under the NSW BC Act 2016.

National

N Weed of National Significance (WoNS)

Table A1: Flora species recorded within the study area

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
MAGNOLIOPSIDA: Magnoliidae							
LILOPSIDA: (Monocotyledons)							
Asparagaceae							
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush						Sept
Cyperaceae							
**Cyperus eragrostis*	Umbrella Sedge						
Iridaceae							
**Romulea rosea* var. *australis*	Onion Grass						
Poaceae							
Austrostipa scabra	Speargrass						
Bothriochloa decipens	Red grass						
Bothriochloa macra	Red Grass						
**Cenchrus clandestinus syn Pennisetum clandestinum*	Kikuyu						
Cynodon dactylon	Common Couch						
Cymbopogon refractus	Barbed Wire Grass						
Enteropogon acicularis							
Eragrostis leptostachya	Paddock Lovegrass						
**Hordeum leporinum*	Barley Grass						
**Lolium perenne*	Perennial Ryegrass						
**Paspalum dilatatum*	Paspalum						
Paspalum distichum	Water Couch						
Sporobolus creber	Slender Rats Tail						
MAGNOLIIDAE (Dicotyledons)							
Aizoaceae							
**Galenia pubescens*	Galenia						
Asteraceae							
**Centaurea calcitrapa*	Star Thistle						
**Centaurea solstitialis*	St Barnaby's Thistle						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
**Cirsium vulgare*	Spear Thistle						Sept
**Hypochaeris radicata*	Catsear, Flatweed						
**Senecio madagascariensis*	Fireweed						Sept, Oct
**Silybum marianum*	Variegated Thistle						
**Sonchus oleraceus*	Common Sow Thistle						
Boraginaceae							
**Heliotropium amplexicaule*	Blue Heliotrope						
Brassicaceae							
**Lepidium africanum*	Peppercress						
Chenopodiaceae							
Einadia hastata	Berry Saltbush						
Einadia nutans	Nodding Saltbush						
Enchylaena tomentosa	Ruby Saltbush						
Convolvulaceae							
Convolvulus erubescens	Australian Bindweed						
Dichondra repens	Kidney Weed						
Euphorbiaceae							
**Euphorbia peplus*	Petty Spurge						
Fabaceae Subfamily (Faboideae)							
Glycine tabacina sp. complex	Love Creeper						
**Trifolium repens*	White Clover						Sept, Oct
Gentianaceae							
**Cenaurium erythraea*	Common Centaury						
Geraniaceae							
Erodium crinitum	Blue Heronsbill						Sept, Oct
Malvaceae							
**Malva parviflora*	Small-flowered Mallow						
**Modiola carliniana*	Red-flowered Mallow						Sept
Sida corrugata	Corrugated Sida						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Sida hackettiana syn *Sida subspicata*	Golden Rod, Spiked Sida						
**Sida rhombifolia*	Paddys Lucerne						
Myrtaceae							
Eucalyptus albens	White Box						
Eucalyptus blakelyi	Blakely's Red Gum						
Eucalyptus crebra	Narrow-leaved Ironbark						Sept, Oct
Eucalyptus melliodora	Yellow Box						
Eucalyptus moluccana	Grey Box						Mar
Nyctaginaceae							
Boerhavia dominii	Tarvine						
Oxalidaceae							
Oxalis perennans	-						
Papaveraceae							
**Argemone ochroleuca var. ochroleuca*	Mexican Poppy						
Polygonaceae							
Rumex brownii	Swamp Dock						
Solanaceae							
**Lycium ferocissimum*	African Boxthorn						
Solanum cinereum	Narrawa Burr						
**Solanum nigrum*	Blackberry Nightshade						
Urticaceae							
Urtica incisa	Stinging Nettle						
Verbenaceae							
**Verbena bonariensis*	Purple Top						

APPENDIX B

SURVEYED TREE DATA

Significant Tree Data Key for Table B1.

- ***DBH** – Diameter at Breast Height. Tree trunk diameter measured at breast height (1.4 metres above ground level).
- ***Tree Height** –(m)
- **Coordinates** - **GDA – 2020, MGA 56**
- **Habitat/Hollows** –

  Class 1 – very large sized hollow openings (i.e., >20cm) suitable for species such as Owls

  Class 2 – large sized hollow openings (i.e., 15-20cm) suitable for species such as Owls and Possums

  Class 3 – medium sized hollow-openings (i.e., 5-15cm) suitable for species such as Gliders and Possums

  Class 4 – small sized hollow openings (i.e., <5cm) suitable for species such as microchiropteran bats.

  Spout - Hollow opening towards sky offering little protection from the weather

  Arboreal Termite Nest – provides potential nesting opportunities for hollow-dependent birds, such as kingfishers and kookaburras

Table B1: Details of trees within the subject areas.

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
1	*Eucalyptus crebra* Narrow-leaved Ironbark	300969	6437331	0.7	16						No
2	*Eucalyptus crebra*	300985	6437331	0.77	16			1			No
3	*Eucalyptus crebra*	300987	6437362	0.78	16				1		No
4	*Eucalyptus crebra*	300993	6437365	0.59	14						No
5	*Eucalyptus moluccana* Grey Box	301012	6437374	1.08	18	2	3	2	3		No
6	*Eucalyptus crebra*	301023	6437376	0.76 0.35	12						No
7	*Eucalyptus crebra*	300935	6437377	0.68	15						No
8	*Eucalyptus crebra*	300927	6437344	0.74	16						No
9	*Eucalyptus crebra*	300923	6437340	0.67	14						No
10	*Eucalyptus melliodora* Yellow Box	300669	6437724	1.04	11		1	2	3		**Possible Branch removal**
11	*Eucalyptus crebra*	300701	6437690	0.64 0.61	16				1		**Possible Branch removal**
12	*Eucalyptus crebra*	300731	6437701	1.0	15	3	2		4	Opening at base of the tree. Tree half dead	**LIkely Removal**
13	*Eucalyptus blakelyi* Blakely's Red Gum	300732	6437687	0.73	16			1	1	*Apis mellifera* (European Bee) Hive, Starlings Nest in hollow.	**Possible Branch removal**
14	*Eucalyptus crebra*	300720	6437678	0.79	15			1		Broken Spout	**Possible Branch removal**
15	*Eucalyptus blakelyi*	300712	6437663	1.07	4.5					Remaining Tree Trunk with new growth	No
16	*Eucalyptus crebra*	300690	6437658	0.89	16						No
17	*Eucalyptus crebra*	300693	6437643	0.71	12				1		No

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
18	*Eucalyptus crebra*	300703	6437645	0.61	10			1		Wire hanging off tree.	No
19	*Eucalyptus blakelyi*	300684	6437622	0.79	9		1	1	1		No
20	*Eucalyptus blakelyi*	300675	6437613	0.90	16	1?	1	1	2	Scar & cracks on side of tree trunk.	No
21	*Eucalyptus crebra*	300697	6437607	0.64	11						No
22	*Eucalyptus crebra*	300743	6437638	0.8	14			1	2		No
23	*Eucalyptus blakelyi*	300621	6437618	0.85	16						No
24	*Eucalyptus melliodora*	300775	6437792	0.79	14						No
25	*Eucalyptus crebra*	300746	6437767	0.78	14				1?		No
26	*Eucalyptus blakelyi*	300734	6437770	1.16	14		1	1	3		**Possible**
27	*Eucalyptus blakelyi*	300723	6437784	0.83	14		1			Concrete structures around Base of tree, water troughs?	No
28	*Eucalyptus crebra*	300679	6437806	0.97	15			1	2		No
29	*Eucalyptus crebra*	300714	6437865	0.7	9					Near shed	No
30	*Eucalyptus crebra*	300774	6437846	0.99	13				1	Close to proposed 11kv HV Cable	**Possible**
31	Dead Tree	300781	6437781	0.71	11					Close to proposed 11kv HV Cable Loose bark, cracks.	**Possible**