Ecological Assessment Report

for the

proposed installation of a Battery Energy Storage System (BESS)

at

Lot 1 DP 1265736

No. 1154 Clarence Town Road,

SEAHAM

NSW

Prepared by: WILDTHING Environmental Consultants

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Job No: 12785

Updated March 2024

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Project Name	Ecological Assessment Report for the installation of a Battery Energy Storage System (BESS) at Lot 1 DP 1265736 1154 Clarence Town Road, Seaham NSW.	
Project Number	12785	
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Version Number	5	

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 cable at 1154 Clarence Town Road, Seaham NSW. The subject land consisted of Lot 1 DP 1265736 (No. 1154) Clarence Town Road, Seaham NSW. The irregular shaped 37.1ha lot was bounded by a small portion of Clarence Town Road to the northwest, a substation to the north and large rural lots to the west, east and south. The subject land is Zoned RU2 – Rural Landscape and located in Port Stephens Council LGA. The study area included the established road access just east of the centre of the subject land, the proposed access road to the proposed Battery Energy Storage System (BESS) footprint, the footprint of the BESS, APZ and the proposed cable route.

Native vegetation in the form of sclerophyll forest/woodland was present in a large remnant patch and lining the creeklines within the subject land. The subject land also contained large areas of heavily grazed grassland with scattered remnant trees. 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. Dominant canopy species included *Corymbia maculata* (Spotted Gum)*; Eucalyptus siderophloia* (Grey Ironbark) and *Melaleuca nodosa* (Prickly-leaved Paperbark). The Koala Food Tree species *Eucalyptus tereticornis* (Forest Red Gum) was also present within the site.

The vegetation of the study area was stratified by assigning the vegetation to Plant Community Types (PCTs) detailed in the NSW Vegetation Information System (VIS) classification database, the following PCTs were present within the study area:

- PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest;
- Grazed exotic groundcover with scattered trees;
- Managed Roadside Grassland.

PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest was found to be most consistent with the Endangered Ecological Community - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions.

As a result of the proposal, approximately 0.36ha of Lower Hunter Spotted Gum—Ironbark Forest will be removed, which includes the removal of up to 36 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 Lower Hunter Spotted Gum—Ironbark Forest in the NSW North Coast Bioregion 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 25 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.

The threatened fauna species *Miniopterus australis* (Little Bentwing Bat) was recorded within the subject land and potential evidence of *Phascolarctos cinereus* (Koala) was also recorded within the study area during fieldwork.

Pock marks on the boles of trees was recorded during fieldwork. It was difficult to determine if these were caused by Common Brushtail Possum, which was observed in large numbers within the subject land, or was evidence of one threatened species, *Phascolarctos cinereus* (Koala). No scats associated with this species was observed at the base of surveyed trees. Due to a number of local records within the last 5 years within 1km of the subject land and the presence of the Koala Food Tree species *Eucalyptus tereticornis,* the precautionary principle was taken and it was assumed *P. cinereus* utilises the study area. Suitable habitat was found to be present across the subject land within areas of open forest and woodland. One preferred feed tree species *Eucalyptus tereticornis* (Forest Red Gum) listed

under the Port Stephens CKPoM was present within the subject land. As a result of the CKPoM assessment the canopy trees identified as PCT 3433 in the south of the study area was found to constitute Preferred Koala Habitat Fieldwork suggests that the study area may be utilised occasionally by a small number of Koalas as part of a much larger are of habitat, however there was no evidence of recent activity in the form of scats.

The proposal will result in the removal of approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land. Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat. No areas of habitat are likely to become significantly fragmented or isolated from other areas of habitat as a result of the proposed action. A number of recommendations including the retention of Preferred Koala Habitat wherever possible, planting of compensatory Koala Feed Trees according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014), and allowing the safe movement of Koalas through the site have been given to help reduce the impact of the development on the Koala (Section 8.0). Taking the recommendations into consideration it is less likely that the proposal will disrupt the life cycle of the Koala such that local extinction would occur.

Miniopterus australis was positively identified within the site during the microchiropteran bat call survey. The entire site is likely to contain suitable hunting habitat for this microchiropteran bat species. Preferred roosting habitat in the form of caves was absent within the site, however man-made structures in the form of two dwellings and associated infrastructure was located within the subject land. Roosting in the form of tree hollows was present within the study area. The removal of vegetation and up to 4 hollow-bearing trees from this site may result in an incremental loss in the quality of hunting and roosting habitat in the local area. . 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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014). This mitigation measure will ensure that no net loss of hollows will result from the proposed development. Taking into consideration the relatively large amount of suitable hunting and roosting habitat retained within the subject land and within the local area, the absence of preferred roosting habitat within the site and the recommendation for compensatory nest boxes the proposal is unlikely to disrupt the life cycle of *M. australis* such that local extinction would occur.

No other threatened fauna species were recorded during fieldwork. Of the 52 remaining addressed threatened fauna species the subject site was considered to contain suitable habitat for 35 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 0.36ha of highly disturbed PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- Removal of up to 0.36ha of highly disturbed example of the EEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions;
- Removal of up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees;
- Removal of up to four hollow-bearing trees;
- Removal of up to 35 trees (Appendix B), including up to 15 CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) and the trimming of one limb from Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark);
- Removal of known habitat for *Miniopterus australis* (Little Bentwing Bat);
- Removal of known habitat for the *Phascolarctos cinereus* (Koala);
- Removal of known habitat for a number of the addressed threatened species.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (1999). 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 3433, the EEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and known habitat for three threatened species; *Phascolarctos cinereus* (Koala), and *Miniopterus australis* (Little Bentwing Bat). 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

LIST OF APPENDICES

Acronyms and Abbreviations used in this report

AOBV	Area of outstanding Biodiversity Value
BAAS	Biodiversity Assessors Accreditation System
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOPC	Biodiversity Offsets Payment Calculator
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
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 a Battery Energy Storage System (BESS), APZ and associated infrastructure such as an access road and cable at 1154 Clarence Town Road, Seaham 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 subject land consisted of Lot 1 DP 1265736 (No. 1154) Clarence Town Road, Seaham NSW. The irregular shaped 37.1ha lot was bounded by a small portion of Clarence Town Road to the northwest, a substation to the north and large rural lots to the west, east and south. The subject land is zoned as RU2 - Rural Landscape. The subject land was covered in native vegetation in the form of woodland, riparian zone and scattered paddock trees. A dwelling was located in the in the central north and south of the subject land, with an established driveway access from Clarence Town Road dissecting the subject land just east of the centre of the subject land.

The study area included the established road access just east of the centre of the subject land, the proposed access road to the proposed Battery Energy Storage System (BESS) footprint, the footprint of the BESS, associated APZ and the proposed cable route and underbore pits. Spotlighting was undertaken within the scattered trees present within the impact area, within the remnant of woodland and within the drainagelines near the proposal.

A location map and aerial photo of the subject land 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 cable be installed in Lot 1 DP 1265736 (No. 1154) Clarence Town Road, Seaham NSW. The access road has primarily been positioned within an established driveway just to the east of the centre of the subject land. This driveway access already facilitates access to a dwelling in the south of the subject and a dwelling in the neighbouring Lot. The access road following the southern boundary of the subject land has been positioned within highly disturbed grassland. The footprint of the BESS and associated APZ has been positioned within highly disturbed grassland containing scattered trees. All Bushfire requirements (Hunter Valley Bushfire Consulting Services, 2023) have been considered in the impact area and shown in Figure 1.2 and 1.3.The cable has been positioned to run parallel with the western boundary fence. In the location where the cable traverses the third order stream, which is also mapped Biodiversity Values, underboring will be undertaken with the underbore pits located within non-native paddock vegetation outside the riparian zone of the stream. The location where the cable underbores the stream has been positioned within the most disturbed location of the third order stream.

Plans of the proposal are shown in Figures 1.2 & 1.3.

Figure 1.1 Location Map

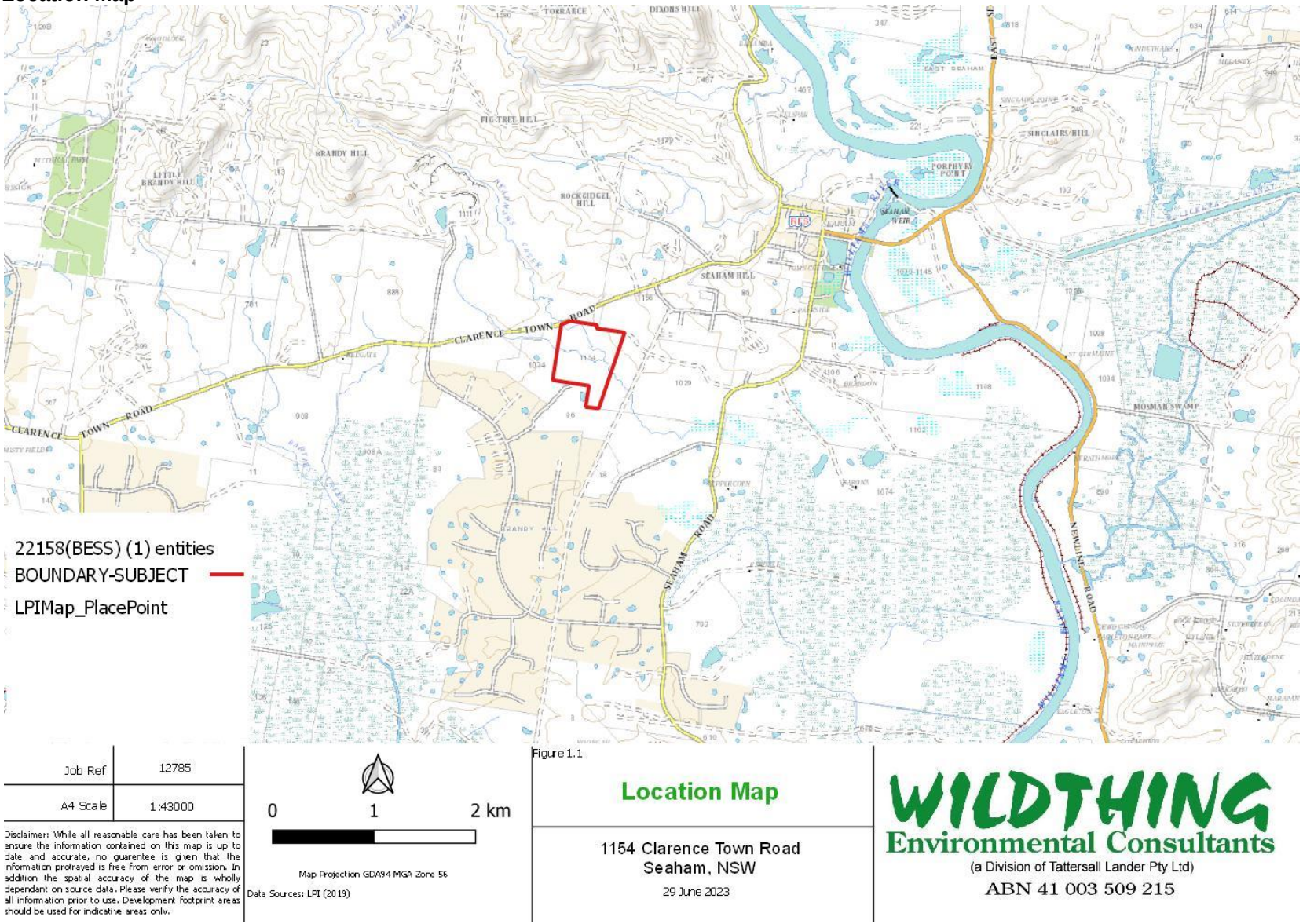
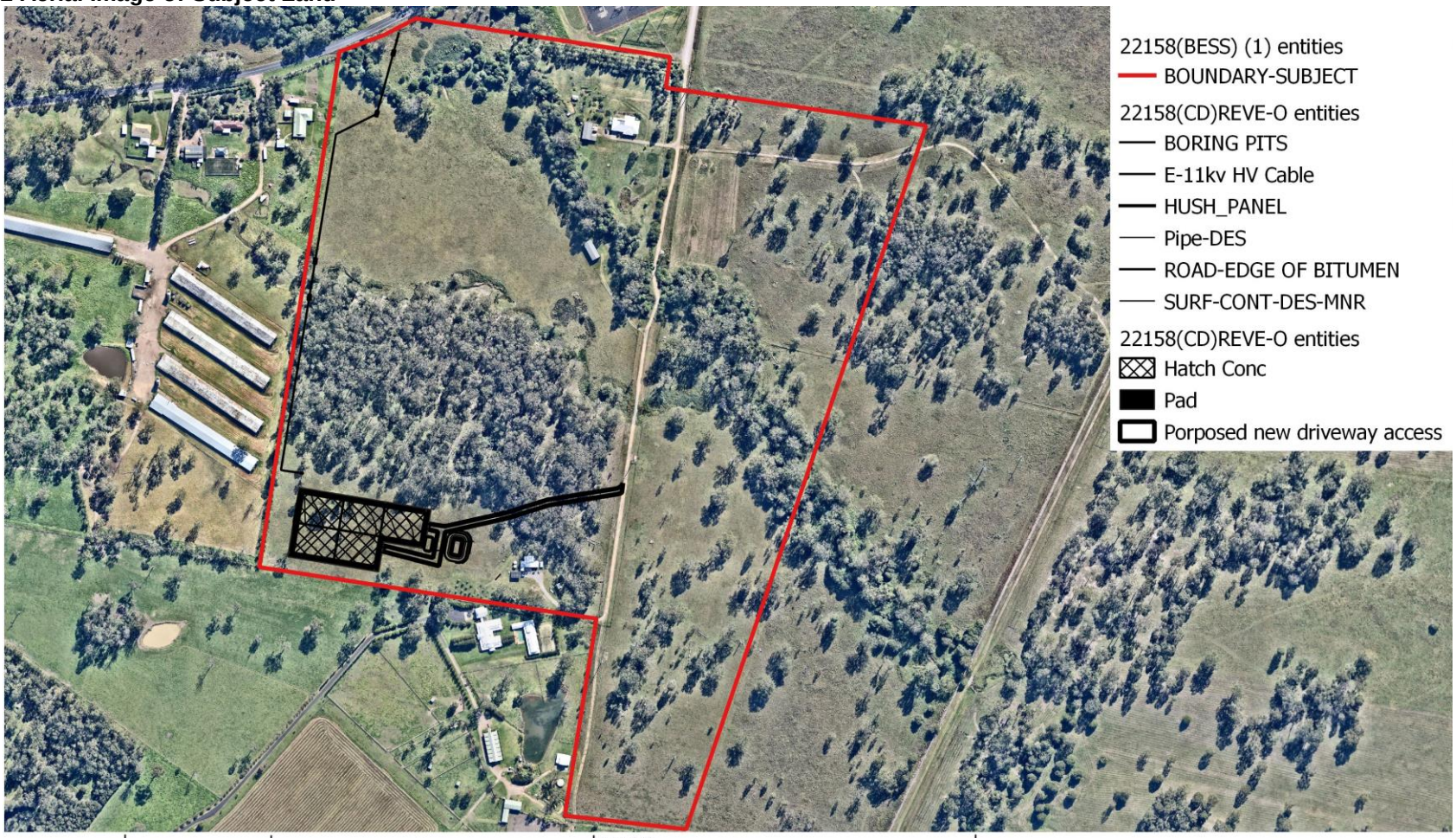


Figure 1.2 Aerial Image of Subject Land



Job Ref	12785
A4 Scale	1:5200

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.

0 100 200 m

Map Projection GDA94 MGA Zone 56

Data Sources: LPI (2019), Nearmap (2024)

Figure 1.2

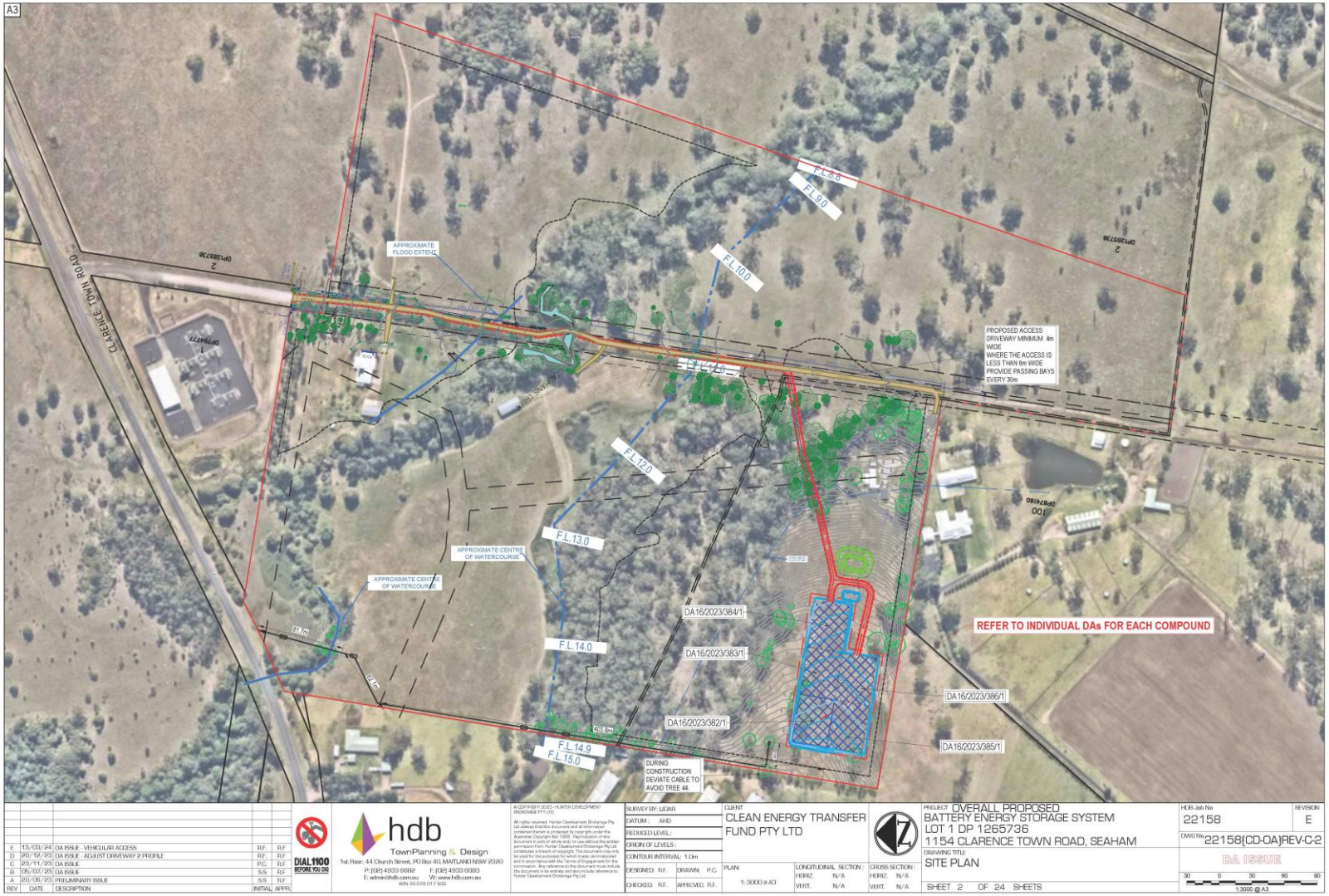
Aerial Image of Subject Land and Proposal

1154 Clarence Town Road
Seaham, NSW

21 March 2024

WILDTHING Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

Figure 1.3 Design Plans



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 Port Stephens Council Local Government Area (LGA) and is zoned as RU2: Rural Landscape. The Port Stephens Comprehensive Koala Plan of Management (CKPoM) (Port Stephens Council 2002) maps the east of the subject land, including the study area as Marginal habitat for Koala.

2.1 HYDROGEOGRAPHY

Two tributaries of Deadman's Creek traversed the subject land from east to northwest. One tributary traversing the centre of the subject land is a first order stream. The northernmost tributary is a third order stream. See Figure 1.1.

2.2 TOPOGRAPHY AND SOILS

The subject land is located within the Lower Hunter Channels and Floodplains and Newcastle Coastal Ramp BioNet Landscapes (Mitchell Landscape). The majority of the impact area was located within the Lower Hunter Channels and Floodplains BioNet Landscape. The subject land contained four Soil Landscapes, Wallalong (wgx) in the south west and north east, Seaham Variant b (sezb) in the north west, Wallalong Variant a (wgxa) in the south east and Seaham (sez) in the central north (DPIE 2020). The majority of the impact area was located within the Wallalong Soil Landscape.

2.3 VEGETATION

Native vegetation in the form of sclerophyll forest/woodland was present in a large remnant patch and lining the creeklines within the subject land. The subject land also contained large areas of heavily grazed grassland with scattered remnant trees. 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. Dominant canopy species included *Corymbia maculata* (Spotted Gum)*; Eucalyptus siderophloia* (Grey Ironbark) and *Melaleuca nodosa* (Prickly-leaved Paperbark). The Koala Food Tree species *Eucalyptus tereticornis* (Forest Red Gum) was also present within the site.

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.

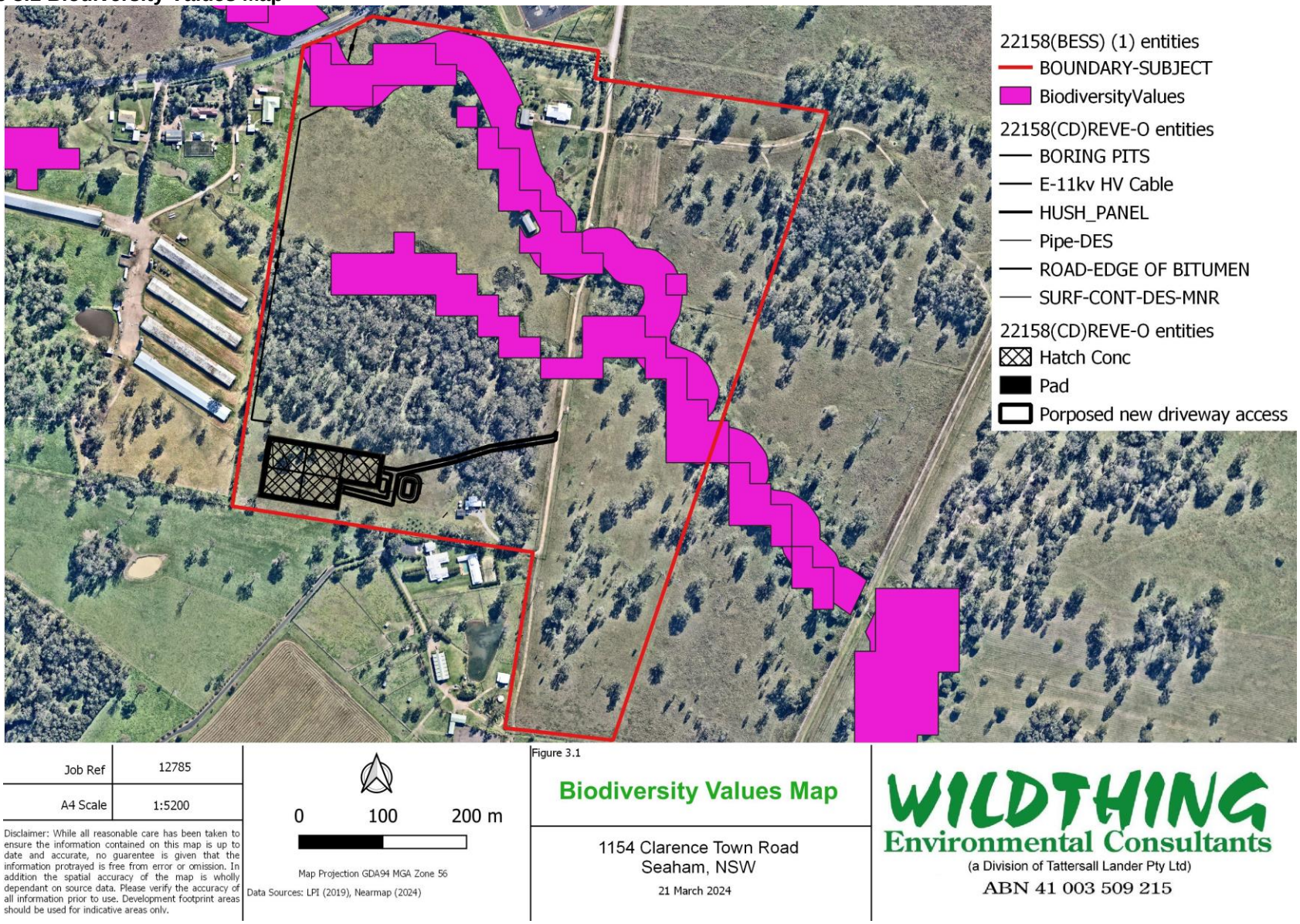
As the proposed development was not found to comply within any of the criteria it was determined that a BDAR and entry into the BOS threshold would not be applicable for this development. Thus, the survey methodology detailed in the following sections have been undertaken in accordance with the requirements 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 18 May 2023. As of this date it was determined that there were areas of mapped 'Biodiversity Values' within the subject land. However, the proposal will underbore the proposed cable within the location of the mapped Biodiversity Values (BV), with the underbore pit points being positioned in non-native paddock vegetation outside the riparian zone of the stream. Consequently, the proposed development would not exceed the biodiversity offsets scheme threshold in regard to Section 7.2(b) of the BC Act. 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 well under 1ha. Consequently, the proposed development would not exceed the biodiversity offsets scheme threshold regarding Section 7.2(b) of the BC Act.

Figure 3.1 Biodiversity Values Map



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 Port Stephens Council and is zoned as RU2. Therefore, the subject land falls under 'Chapter 3 Koala habitat protection' 2020 of the SEPP (Biodiversity and Conservation) 2021.

3.4 PORT STEPHENS COMPREHENSIVE KOALA PLAN OF MANAGEMENT (CKPOM)

As Port Stephens Council has an approved Koala Plan of Management Chapter 3 is addressed by considering the Port Stephens Comprehensive Koala Plan of Management. The Port Stephens Comprehensive Koala Plan of Management (CKPoM) has been prepared for the Port Stephens LGA in accordance with State Environment Planning Policy (SEPP) 44 - 'Koala Habitat Protection'. The aim of the CKPoM is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline. An assessment under the Port Stephens CKPoM has been undertaken in Section 8.0 of the report.

3.5 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).

3.6 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.

3.7 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)	30 May 2023	10x10km radius of subject land
Commonwealth Protected Matters Search Tool (PMST) (DCCEEW 2022a)	30 May 2023	10x10km radius of subject land
NSW Biodiversity Values Map (DPIE 2022b)	15 March 2024	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)	30 May 2023	Entire subject land
NSW Government SEED Mapping (NSW Government 2022)	30 May 2023	Entire subject land
BioNet NSW (Mitchell) Landscapes – Version 3.1 (OEH 2016a)	22 June 2023	Entire subject land
NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 (DAWE 2016).	22 June 2023	Entire subject land
Threatened Species and Vegetation Databases		
Commonwealth species profiles and threats database (SPRAT) (DCCEEW 2022a)	22 June 2023	-
DPE Profiles of threatened species, population, and ecological communities (DPIE 2022d)	22 June 2023	-
DPE BioNet vegetation classification database (DPIE 2022c)	22 June 2023	-
Reports		
Biosis (2016) Brandy Hill Quarry Expansion Biodiversity Assessment Report for Hanson Construction Minerals Pty Ltd 8 November 2016.	June 2023	Brandy Hill Quarry
Hunter Valley Bushfire Consulting Services (2023) Bushfire Assessment Report (BAR) for the proposed battery energy storage system buildings of Class 5 to 8 (PBP, 2019, Part 8 - Other Development) 1154 Clarence Town Road, Seaham NSW 2324 (Lot 1, DP: 1265736)	August 2023	Study area
Plans		
Hdb Town Planning and Design Proposed Battery Energy Storage System Lot 1 DP 1265736 1154 Clarence Town Rad, Seaham Revised Issue 14/06/2023.	June 2023	Study area
Hdb Town Planning and Design Proposed Battery Energy Storage System Lot 1 DP 1265736 1154 Clarence Town Rad, Seaham Revised Issue 05/07/2023.	July 2023	Study area
Hdb Town Planning and Design Proposed Battery Energy Storage System Lot 1 DP 1265736 1154 Clarence Town Rad, Seaham Revised Issue 08/08/2023.	August 2023	Study area

Hdb Town Planning and Design Proposed Battery Energy Storage System Lot 1 DP 1265736 1154 Clarence Town Rad, Seaham Revised Issue 13/03/2024.	March 2024	Study area

FIELD ASSESSMENT

Fieldwork was undertaken in June 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
Thursday 1/06/2023	1300– 1530	5h (2 persons)	General site inspection Vegetation survey Diurnal fauna survey Tree survey Incidental observations	7/8 Cloud, 22.4°C, 47% relative humidity, Wind 13km//hr WNW
Friday 9/06/2023	1700 – 1830	3h (2 persons)	Set camera traps Set anabat survey Diurnal fauna survey Incidental observations Spotlight Incidental observations	1/8 Cloud, 16.4°C, 47% relative humidity, Wind 11.1km/h WNW
Thursday 15/06/2023	0950 - 1220	5h (2 persons)	Camera trap retrieval Tree Survey Incidental observations	0/8 Cloud, 14.2°C, 50% relative humidity, Wind 16.7km/hr WNW
Friday 15/03/2024	0900-0940	0h 40min (1 person)	Vegetation survey Tree Survey Incidental observations	8/8 Cloud, 21°C, 87% relative humidity, 5.6mm precipitation, Wind 5.5km/hr NW

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:

4.1.1 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. All field survey tracks for both flora and fauna surveys are shown in Figure 4.1.

4.1.2 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;
- continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors; and
- structural and floral diversity.

4.1.3 HABITAT FOR SIGNIFICANT SPECIES

The subject land area was 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.

4.1.4 TREE SURVEY

During the fieldwork, a survey was undertaken to identify trees within the impact area. The survey also involved identifying any hollow-bearing trees and Koala Food 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.

4.1.5 TERRESTRIAL FAUNA APPRAISAL METHODOLOGY

The methodology adopted consisted of an assessment of the potential use of the site by any Schedule 1 and 2 fauna identified on the DPIE and DAWE Databases. This was undertaken by both appraising the extent of likely habitat upon the site, searches for secondary indications of threatened species utilising the site, and incidental observations of native fauna in general. The survey was carried out 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).

4.1.6 AMPHIBIAN SURVEY

Amphibian surveys included a combination of diurnal and nocturnal census methods. Systematic searches involved opportunistic searches within appropriate habitat for basking or sheltering individuals. Appropriate cover such as logs was turned over for resting individuals. Nocturnal surveys were undertaken in suitable habitat and involved listening for the characteristic call of male frogs. No areas of suitable surface water, flowing streams or swampy areas were present within the impact area which limited suitable habitat for several amphibian species.

4.1.7 REPTILE SURVEY

Searches for reptiles involved a combination of diurnal and nocturnal searches. Diurnal searches for reptiles involved searching in likely habitat (i.e. leaf litter, dead logs and long grass) during the morning and afternoon survey period. Nocturnal searches were conducted for reptile species active at night such as geckos and some species of snakes and involved searching in likely habitats with the aid of a spotlight.

4.1.8 DIURNAL AVIFAUNA SURVEY

The diurnal avifauna survey involved transects targeting potential habitat within the site for species such as *Daphoenositta chrysoptera* (Varied Sittella) and *Glossopsitta pusilla* (Little Lorikeet). Surveys were conducted at peak activity periods (i.e. dawn and dusk). Incidental observations and secondary indications (i.e. distinctive feathers and nests) of avifauna were also recorded. Searches for chewed cones underneath Allocasuarina trees were also conducted to determine the presence of *Calyptorhynchus lathami* (Glossy Black Cockatoos).

4.1.9 SPOTLIGHTING SURVEY

Spotlighting was undertaken on foot over one night with two persons. The spotlighting survey involved walking at a slow pace around the study area and stopping every 2 minutes, allowing the observer to hear movements of animals.

4.1.10 CAMERA TRAPPING CAMERA SURVEY

Two Camera traps (Reconyx Hyperfire 2 & Swift Enduro) were set up for a total of 12 trap nights within the subject land from 9 - 15 June 2023. The cameras were set either for arboreal mammals or terrestrial mammals and were set facing larger Ironbark trees to target Brush-tailed Phascogale. The bait consisted of a rolled oats and honey mixture, peanut butter. The locations of the camera traps within the study land are shown in Figure 4.1.

4.1.11 MICROCHIROPTERAN BAT CALL SURVEY

Bat echo-location calls were recorded using an Anabat Swift in areas which were considered likely to be used by bats. The position was selected to sample potential hunting sites for bats, including flyways, clearings and ecotones. Echolocation surveys used stationary surveys from 9 - 15 June 2023. The bat calls recorded by Wildthing Environmental Consultants were analysed in-house by Mungo Worth. The location of the Anabat Survey within the study land is shown in Figure 4.1.

4.2 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. Pelagic species were not included in the list due to the absence of habitat.

Figure 4.1 Camera Trap and Anabat Survey Locations

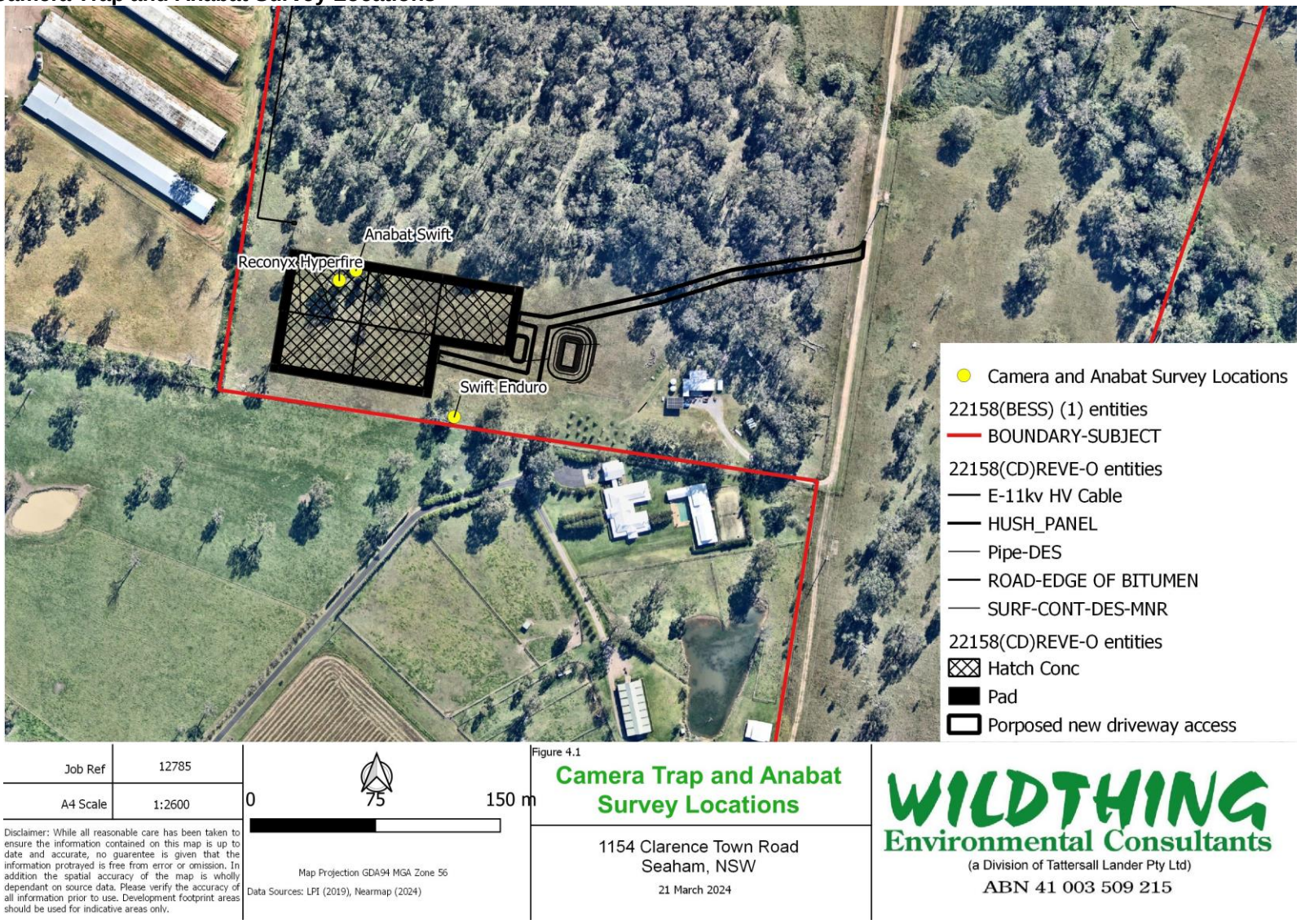


Table 4.3: Threatened species, endangered populations and ecological communities considered.

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Flora Species			
**Caladenia tessellata*	Thick-lipped Spider-orchid	E1	V
**Cryptostylis hunteriana*	Leafless Tongue Orchid	V	V
**Prasophyllum* sp. *Wybong*	A Leek Orchid		CE
Pterostylis chaetophora	Tall Rustyhood	V	V
Pterostylis gibbosa	Illawarra Greenhood	E1	E
**Rhizanthella slateri*	Eastern Underground Orchid	V	E
**Arthraxon hispidus*	Hairy-joint Grass	V	V
**Dichanthium setosum*	Bluegrass	V	V
**Cynanchum elegans*	White-flowered Wax Plant	E1	E
**Rutidosis heterogama*	Heath Wrinklewort	V	V
**Tetratheca juncea*	Black-eyed Susan	V	V
**Angophora inopina*	Charmhaven Apple	V	V
**Eucalyptus camfieldii*	Camfield's Stringybark	V	V
Eucalyptus glaucina	Slaty Red Gum	V	V
**Eucalyptus parramattensis* subsp. *decadens*	Drooping Red Gum	V	V
**Melaleuca biconvexa*	Biconvex Paperbark	V	V
Rhodamnia rubescens	Scrub Turpentine	E4A	CE
**Rhodomyrtus psidioides*	Native Guava	E4A	CE
**Syzygium paniculatum*	Magenta Lilly Pilly	E1	V
**Euphrasia arguta*		E4A	CE
Persicaria elatior	Tall Knotweed	V	V
**Grevillea parviflora* subsp. *parviflora*	Small-flowered Grevillea	V	V
**Commersonia prostrata*	Dwarf Kerrawang	E1	E
**Pomaderris brunnea*	Brown Pomaderris	E1	V
**Asperula asthenes*	Trailing Woodruff	V	V
**Thesium australe*	Austral Toadflax	V	V
Amphibians			
**Litoria aurea*	Green and Golden Bell Frog	E1	V
**Mixophyes balbus*	Stuttering Frog	E1	V
**Uperoleia mahonyi*	Mahony's Toadlet	E1	E
Reptiles			
**Delma impar*	Striped Legless Lizard	V	V
Birds			
**Actitis hypoleucos*	Common Sandpiper		M
**Calidris acuminata*	Sharp-tailed Sandpiper		M
**Calidris ferruginea*	Curlew Sandpiper	E1	CE & M
**Calidris melanotos*	Pectoral Sandpiper		M
**Gallinago hardwickii*	Latham's Snipe		M
**Limosa lapponica*	Bar-tailed Godwit		M
**Numenius madagascariensis*	Eastern Curlew		CE & M
**Tringa nebularia*	Common Greenshank		M
**Charadrius leschenaultii*	Greater Sand-plover	V	V & M
**Rostratula australis*	Australian Painted Snipe	E1	E
**Cuculus optatus*	Oriental Cuckoo		M
**Botaurus poiciloptilus*	Australian Bittern	E1	E
Ephippiorhynchus asiaticus	Black-necked Stork	E1	
Anseranas semipalmata	Magpie Goose	V	
Apus pacificus	Fork-tailed Swift		M
Irediparra gallinacea	Comb-crested Jacana	V	
**Sternula nereis nereis*	Australian Fairy Tern		V
Ptilinopus magnificus	Wompoo Fruit-Dove	V	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
**Callocephalon fimbriatum*	Gang Gang Cockatoo	V	E
Lathamus discolor	Swift Parrot	E1	CE
**Neophema chrysostoma*	Blue-winged Parrot		V
Neophema pulchella	Turquoise Parrot	V	
Glossopsitta pusilla	Little Lorikeet	V	
**Hirundapus caudacutus*	White-throated Needletail		V & M
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	
**Monarcha melanopsis*	Black-faced Monarch		M
**Symposiachrus trivirgatus as Monarcha trivirgatus*	Spectacled Monarch		M
**Pycnoptilus floccosus*	Pilotbird		V
Epthianura albifrons	White-fronted Chat	V	
**Melanodryas cucullata cucullata*	Hooded Robin	V	
Petroica boodang	Scarlet Robin	V	
**Myiagra cyanoleuca*	Satin Flycatcher		M
**Rhipidura rufifrons*	Rufous Fantail		M
Climacteris picumnus victoriae	Brown Treecreeper	V	V
**Stagonopleura guttata*	Diamond Firetail	V	V
**Motacilla flava*	Yellow Wagtail		M
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	
Daphoenositta chrysoptera	Varied Sittella	V	
Circus assimilis	Spotted Harrier	V	
**Pandion cristatus*	Eastern Osprey	V	M
Lophoictinia isura	Square-tailed Kite	V	
**Erythrotriorchis radiatus*	Red Goshawk	E4A	V
Hieraaetus morphnoides	Little Eagle	V	
Haliaeetus leucogaster	White-bellied Sea Eagle	V	M
**Falco hypoleucos*	Grey Falcon	E1	V
Falco subniger	Black Falcon	V	
Ninox strenua	Powerful Owl	V	
Tyto longimembris	Eastern Grass Owl	V	
Mammals			
Dasyurus maculatus 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
**Macropus parma*	Parma Wallaby	V	V
**Potorous tridactylus tridactylus*	Long-nosed Potoroo	V	V
**Petaurus australis*	Yellow-bellied Glider	V	V
Petaurus norfolcensis	Squirrel Glider	V	
Petauroides volans	Greater Glider	E	E
**Pseudomys novaehollandiae*	New Holland Mouse		V
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	
Miniopterus australis	Little Bentwing-bat	V	
Miniopterus orianae oceanensis	Large Bentwing-bat	V	
Myotis macropus	Southern Myotis	V	
**Chalinolobus dwyeri*	Large Pied Bat	V	V

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Endangered Ecological Communities			
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions		E3	
Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions		E3	
Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions		E3	
Central Hunter Valley eucalypt forest and woodland			CE
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community			E
Coastal Upland Swamp in the Sydney Basin Bioregion		E3	
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions		E3	
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	
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions		E3	
Hunter Valley Weeping Myall (Acacia pendula) Woodland			CE
Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion		E4B	
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion		E4B	
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion		E3	
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
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	
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		E3	
Lowland Rainforest of Subtropical Australia			CE
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion		E3	
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	
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Swamp Sclerophyll 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	
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion		E3	
Warkworth Sands Woodland in the Sydney Basin Bioregion		E3	
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and		E4B	
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			CE
Central Hunter Valley eucalypt forest and woodland			CE
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community			E

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

The subject land has been subject to past historic native vegetation clearance and prolonged grazing by livestock. A large remnant patch of woodland containing native canopy species and groundcovers was also present. This vegetation was also present within the riparian zone of the creeklines. The vegetation of the study area was stratified by assigning the vegetation to Plant Community Types (PCTs) detailed in the NSW Vegetation Information System (VIS) classification database, the following PCTs were present within the study area:

- PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest;
- Grazed exotic groundcover with scattered trees;
- Managed Roadside Grassland.

A comprehensive description of the vegetation communities present within the subject land is provided within Tables 5.1 - 5.4. A vegetation map of the study area is shown in Figure 5.1. A full list of the flora species recorded during the fieldwork is listed in Appendix A.

Table 5.1: Details of PCT 3433 within the subject land.

Plant Community Type (PCT) • PCT 3433 – •Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	
PCT No.	PCT 3433
PCT Name	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
Area to be removed for proposal	0.36ha
Vegetation Description within the subject land.	Vegetation within the subject land was found to be in disturbed condition. *Corymbia maculata* (Spotted Gum) was the most common canopy species. Other canopy species included *Eucalyptus fibrosa* (Red Ironbark), *Eucalyptus siderophloia* (Grey Ironbark), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus tereticornis* (Forest Red Gum) and *Melaleuca nodosa* (Prickly-leaved Paperbark). *E. tereticornis* and *M. nodosa* were the dominant species in the patches of clumped paddock trees to the south of the larger patch of PCT3433. In the larger patch of PCT 3433 these species were much less common. *Eucalyptus moluccana* (Grey Box) was observed near the access driveway for the southern dwelling within the subject land. The mid-storey was absent and shrub layer was sparse. Species present included *Acacia falcata* (Falcata Wattle) and the noxious weed *Lantana camara* (Lantana) in small numbers. Common native groundcovers included *Commelina cyanea*, *Dichondra repens* (Kidney Weed), and *Lobelia purpurascens* (Whiteroot). The groundcover was heavily dominated by non-native species including *Ehrharta erecta* (Panic Veldtgrass), *Sporobolus africanus* (Parramatta Grass), *Bidens pilosa, Trifolium repens* (White Clover), *Plantago lanceolata* (Lamb's tongues), *Stachys arvensis* (Stagger Weed), *Taraxacum officinale* (Dandelion) and *Senecio madagascariensis* (Fireweed).
TEC Status	As a result of the presence of *Eucalyptus fibrosa* (Red Ironbark) and being located within the Sydney Basin bioregion, vegetation within the subject land was found to be consistent with the Endangered Ecological Community - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
Examples of PCT 3433 within the study area (Plates 1 - 6).	

Plant Community Type (PCT) • PCT 3433 – •Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Plate 1: PCT 3433 within the subject land.

Plate 2: PCT 3433 within the impact area of the BESS and the southern extent of the large remanent patch.

Plant Community Type (PCT) •	PCT 3433 – •Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Plate 3: PCT 3433 within the proposed cable footprint facing north.

Plate 4: PCT 3433 within the proposed cable footprint facing south.

Plant Community Type (PCT) •	PCT 3433 – •Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Plate 5: PCT 3433 within the subject land, including Tree No. 39

Plate 6: PCT 3433 and the first order stream at the northern extent of the large remnant patch facing south. Impact area of the proposed cable shown in the right of the plate.

Table 5.2: Details of PCT 4042 within the subject land.

Plant Community Type (PCT) • PCT 4042 – • Lower North Riverflat Eucalypt-Paperbark Forest	
PCT No.	PCT 4042
PCT Name	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Vegetation Formation	Forested Wetlands
Vegetation Class	Coastal Floodplain Wetlands
Area to be removed for proposal	0ha. The underbore points are to be positioned outside of the Biodiversity Values mapped area and therefore avoid impact to this community.
Vegetation Description within the subject land.	Vegetation within the subject land was found to be in disturbed condition. *Acacia melanoxylon* (Hickory), *Eucalyptus siderophloia* (Grey Ironbark), and *Melaleuca nodosa* (Prickly-leaved Paperbark) were sparse canopy species within the study area. The study area was dominated by the shrubs *Acacia irrorata* (Green Wattle), *Rubus parvifolius* (Native Raspberry) and *Olea europaea* subsp. *cuspidata* (African Olive). Other dominant species included *Typha orientalis* (Cumbungi), *Pteridium esculentum* (Common Bracken) *Cirsium vulgare* (Spear Thistle), *Cyperus eragrostis* and *Senecio madagascariensis* (Fireweed). *Lantana camara* (Lantana) was also present.
TEC Status	Listed under the BC Act 2016 as the EEC Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion
Examples of PCT 4042 within the study area (Plates 7- 9).	

Plate 7: PCT 4042 within the 3rd order tributary of Deadman's Creek.

Plant Community Type (PCT) • PCT 4042 – • Lower North Riverflat Eucalypt-Paperbark Forest

Plate 8: PCT 4042 within the subject land.

Plate 9: PCT 4042 at the underbore cable route.

Table 5.3: Grazed Exotic Groundcover with Scattered Trees

Grazed Exotic Groundcover with Scattered Trees	
PCT No.	NA
PCT Name	NA
Vegetation Formation	NA
Vegetation Class	NA
Area to be removed for proposal	1.40ha
Vegetation Description within the subject land.	Vegetation in this community consisted of largely exotic low grazed groundcover with scattered native trees. The groundcover was heavily dominated by non-native species including *Ehrharta erecta* (Panic Veldtgrass), *Sporobolus africanus* (Parramatta Grass), *Bidens pilosa, Trifolium repens* (White Clover), *Plantago lanceolata* (Lamb's tongues), *Stachys arvensis* (Stagger Weed), *Taraxacum officinale* (Dandelion) and *Senecio madagascariensis* (Fireweed). Scattered trees within the site included specimens of *Eucalyptus tereticornis* (Forest Red Gum), *Melaleuca nodosa* (Prickly-leaved Paperbark) and *Eucalyptus siderophloia* (Grey Ironbark).
TEC Status	Vegetation present on site was not consistent with a TEC

Examples of Grazed Exotic Groundcover with Scattered Trees within the study area (Plates 10 - 12).

Plate 10: Grazed Exotic Groundcover with Scattered Trees within the proposed cable footprint.

Grazed Exotic Groundcover with Scattered Trees

Plate 11: Grazed Exotic Groundcover with Scattered Trees in the proposed BESS and driveway footprint.

Plate 12: Grazed Exotic Groundcover with Scattered Trees in the north of the subject land within the proposed cable route.

Table 5.4: Managed Roadside Grassland

Managed Roadside Grassland	
PCT No.	NA
PCT Name	NA
Vegetation Formation	NA
Vegetation Class	NA
Area to be removed for proposal	0ha as the access road in this location was already established.
Vegetation Description within the subject land.	Vegetation in this community consisted of maintained roadside grassland. The groundcover was heavily dominated by non-native species including *Chloris gayana* (Rhodes Grass), *Paspalum dilatatum* (Paspalum), *Ehrharta erecta* (Panic Veldtgrass), *Sporobolus africanus* (Parramatta Grass), *Bidens pilosa, Trifolium repens* (White Clover), *Plantago lanceolata* (Lamb's tongues), *Taraxacum officinale* (Dandelion) and *Senecio madagascariensis* (Fireweed).
TEC Status	Vegetation present on site was not consistent with a TEC
Examples of Managed Roadside Grassland within the study area (Plates 13- 15).	

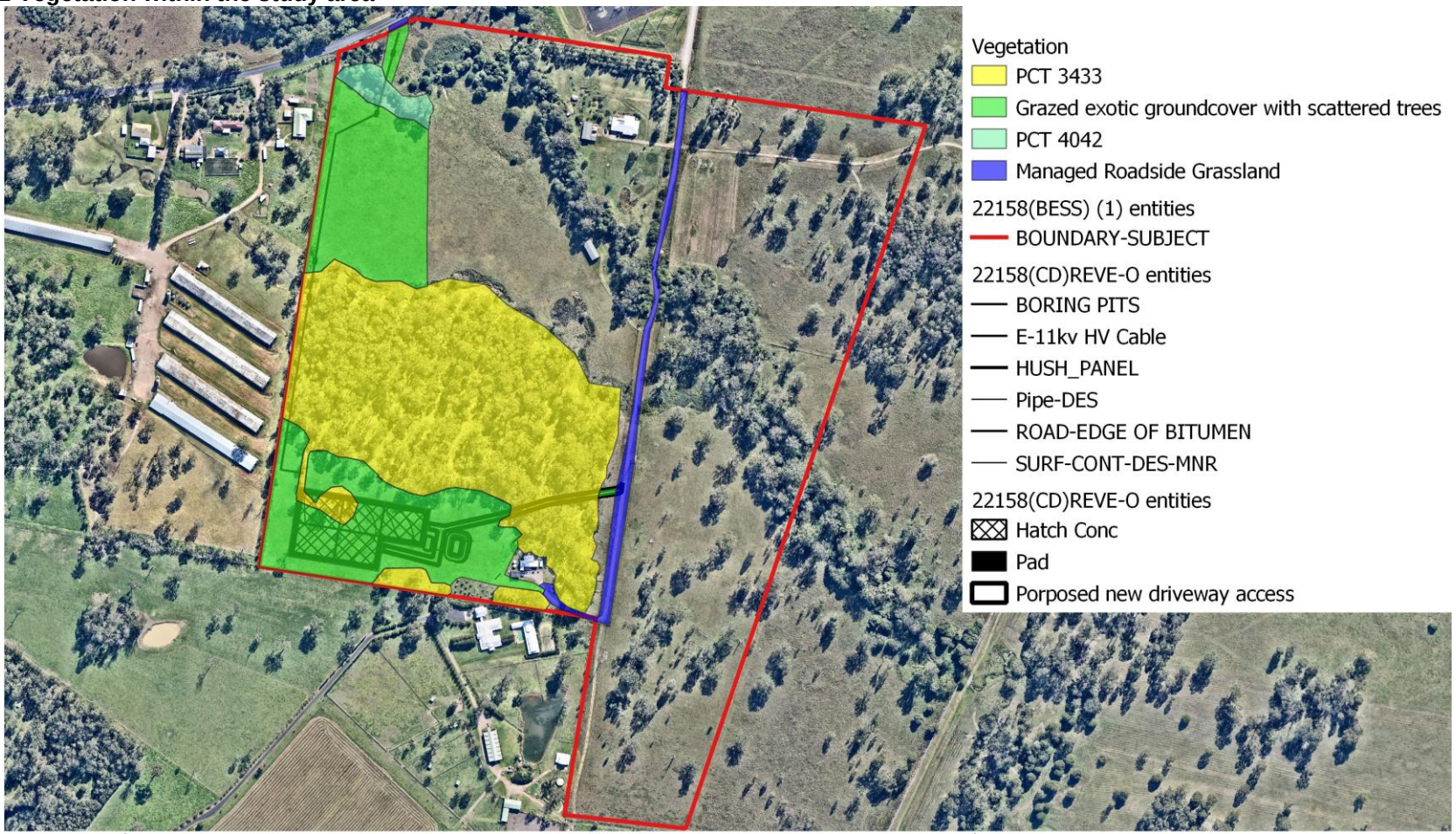
Plate 13: Managed roadside grassland in the south of the subject land within the established access driveway road reserve.

Managed Roadside Grassland

Plate 14: Managed Roadside Grassland in the road reserve of Clarence Town Road in the north of the subject land.

Plate 15: Managed Roadside Grassland in the established access road to the dwelling in the south of the subject land.

Figure 5.1 Vegetation within the study area



5.1.1 THREATENED ECOLOGICAL COMMUNITIES

Twenty-four 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. PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest within the subject land was found to be consistent with the TEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions due to the presence of *Eucalyptus fibrosa* (Red Ironbark) within the subject land and being located within the Sydney Basin bioregion. PCT 4042 Lower North Riverflat Eucalypt-Paperbark Forest within the subject land was found to be consistent with the TEC Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion. This TEC will not be impacted by the proposal due to the cable being installed by underbore within the location of this vegetation community. The impact of the proposal on the TEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions has been addressed in Sections 6 & 7 of this report.

5.1.2 ENDANGERED POPULATIONS

No endangered populations or were recorded within the subject land.

5.1.3 THREATENED AND RARE FLORA SPECIES

Twenty-six 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 fauna species, the most likely species to be present within the subject land were *Prasophyllum* sp. Wybong; *Pterostylis chaetophora*; *Rhizanthella slateri, Rutidosis heterogama*, *Eucalyptus glaucina*; *Persicaria elatior, Grevillea parviflora subsp. parviflora* and *Thesium australe.* Of these species *P. chaetophora* and *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
Lantana camara Lantana	General Biosecurity Duty Prohibition on dealings	T, N
Rubus fruticosus Blackberry	General Biosecurity Duty Prohibition on dealings Regional Recommended Measure	T

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 Dry Sclerophyll Woodland, Actively Grazed Exotic Introduced Grassland with Scattered Trees, Maintained Grassland Habitat within Road Reserve and Aquatic Habitat within the drainagelines. A detailed description of the habitat value of each broad habitat type has been provided below.

Dry Sclerophyll Woodland Habitat

Dry Sclerophyll 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. Hunting opportunities exist for birds of prey, given that the variable tree coverage and understorey vegetation has created a myriad of ecotones and habitat densities. Such habitat is suitable for terrestrial species including small and medium sized mammals, macropods, reptiles and potentially for some frog species adapted to drier areas. One preferred species of Koala feed tree listed under the Port Stephens CKPoM, *Eucalyptus tereticornis* (Forest Red Gum) was recorded within this area of habitat.

Actively Grazed Exotic Introduced Grassland with Scattered Trees

Maintained exotic groundcover would only provide habitat for a small number of species such as granivorous and insectivorous birds and microchiropteran bat species would find potential foraging resources as part of a larger home range. Trees on site offer potential foraging and nesting habitat for several avifauna species. Nectivorous species would find seasonal foraging resources, in the form of a small number of flowering myrtaceous species. Due to the lack of hollow-bearing trees nesting opportunities would be confined to those

species not requiring this resource. The presence of flowering myrtaceous species and a small number of fig trees would offer potential seasonal foraging habitat for Flying Foxes.

Maintained Grassland Habitat within Road Reserve

Maintained Grassland running alongside Clarence Town Road and the pre-existing internal roadway was primarily composed of low maintain groundcovers. Such habitat provides a limited 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

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 49 native trees were recorded within the impact area, however not all trees will require removal. A total of 24 trees will require removal, up to 10 trees are likely to require removal and one tree is uncertain if it require removal (Tree No. 39). Tree Nos. 6 - 28 will require removal for the BESS pad. The access cable will likely impact the structural root zone of Tree Nos. 31 - 38, and 40-43 (Plate 19). It is uncertain if Tree No. 39 (Plates 17 and 18) will require removal. This tree was positioned approximately 4m from the boundary fence and had a ground diameter of approximately 1.56m. This would give a structural root zone of approximately 4m. This tree contains hollows and it is recommended to retain the tree within the scope of the proposal. Tree No. 45 (a juvenile specimen of *Corymbia maculata* Spotted Gum will require removal for the proposed driveway access (Plate 20). and Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark) will require the trimming of one limb for the proposal (Plate 21). The proposal will require the removal of up to four hollow-bearing trees, with the definite removal of one hollow-bearing tree, likely removal of another and it is uncertain if two trees containing hollows will require removal. The proposal will require the removal of 15 specimens of *Eucalyptus tereticornis* (Forest Red Gum), a Koala Food Tree species under the Port Stephens CKPoM. It is recommended that tree removal be avoided wherever possible. Details of each of the 49 trees including height, diameter at breast height (DBH), coordinates and fauna habitat attributes such as hollows are contained Appendix B. The location of the 49 trees are shown in Figure 5.2.

Plate 16: Tree No. 44.

Plate 17: Proposed cable route with Tree No. 39 (large Spotted Gum) in the background facing south.

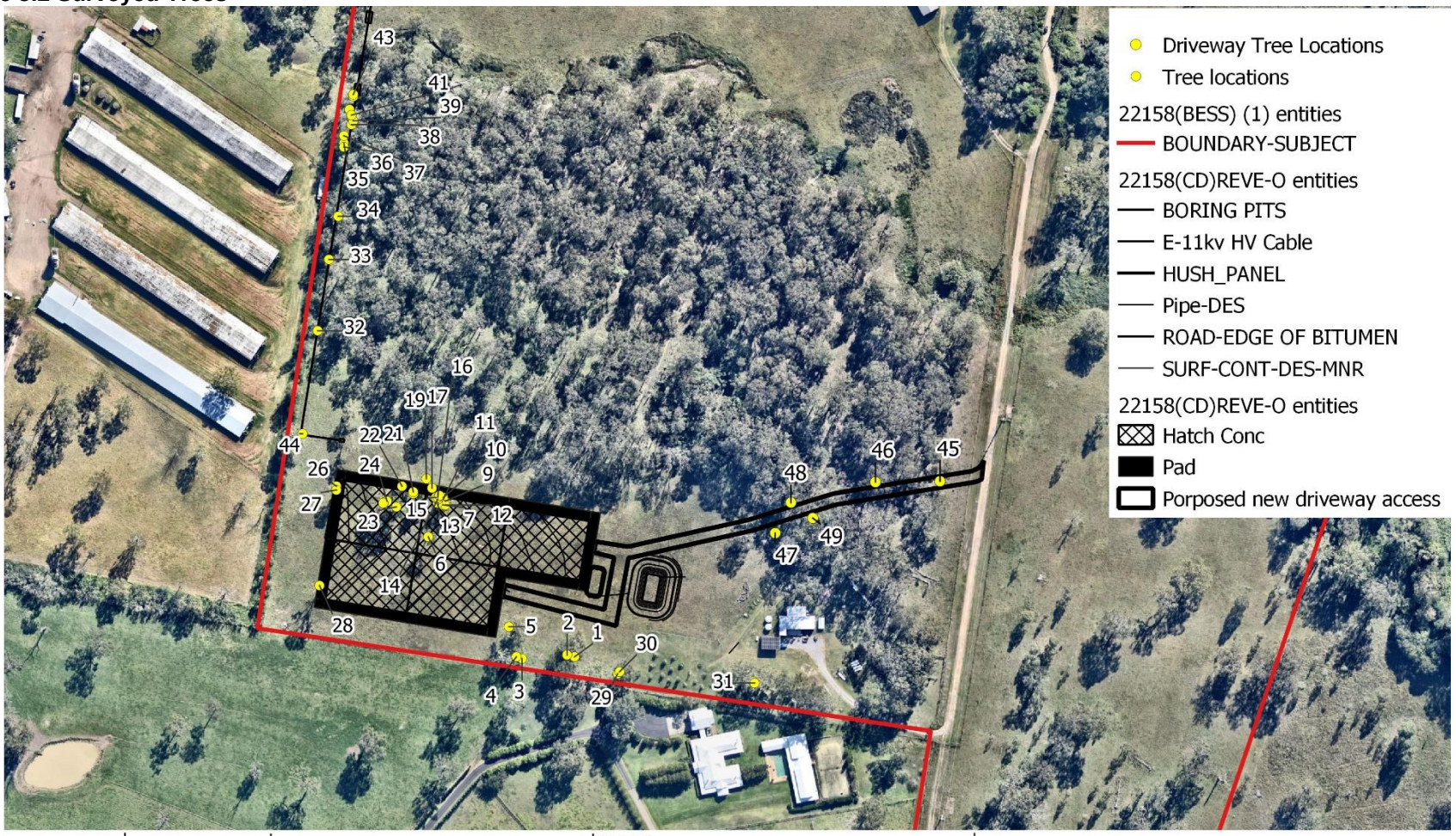
Plate 18: Proposed cable route with Tree No. 39 (large Spotted Gum) in the background facing north.

Plate 19: Trees located in the northern extent of the surveyed trees within the proposed cable impact area.

Plate 20: Tree No 45 requriing removal for the proposal access driveway.

Plate 21: Limb required to be removed from Tree No. 46 for the proposed access driveway.

Figure 5.2 Surveyed Trees



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 subject land and/or the subject land 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 subject land 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 subject land 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 subject land (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 subject land; and/or • Although suitable habitat is present in the subject land 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 subject land 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 subject land 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 subject land 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 subject land and is dependent on identified suitable habitat.
Known	The species was observed in the subject land 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					
Caladenia tessellata Thick-lipped Spider-orchid	E1	V	Yes	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW.	**Unlikely** Suitable habitat was unlikely to be present within the site. No known records within the vicinity of the site.
Cryptostylis hunteriana Leafless Tongue Orchid	V	V	No	Grows in swamp-heath on sandy soils, chiefly in coastal districts, south from the Gibraltar Range. It is known historically from several localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park.	**Unlikely** Suitable habitat was unlikely to be present within the site. No known records within the vicinity of the site.
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.	**Unlikely** Suitable habitat was unlikely to be present within the site. No known records within the vicinity of the site.
Pterostylis chaetophora Tall Rustyhood	V		No	The preferred habitat is seasonally moist, dry sclerophyll forest with a grass and shrub understorey. The most commonly observed habitat is vegetation characterised by grassy open forests or derived native grasslands of Eucalyptus amplifolia and Eucalyptus moluccana on gentle flats, or that are dominated by Corymbia maculata with any of Eucalyptus fibrosa, Eucalyptus siderophloia or Eucalyptus crebra.	**Low-Moderate** Suitable habitat was present within the subject land. No records within 10km, however is known to occur within similar vegetation along Italia Road.
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.	**Unlikely** The site lacks preferred vegetation associations. No known local records.
Rhizanthella slateri Eastern Underground Orchid	V	E1	Yes	Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Grows in sclerophyll forest in shallow to deep loams.	**Low** Marginal habitat was present. No nearby records.
Arthraxon hispidus Hairy-joint Grass				Occurs over a wide area in south-east Queensland, and on the northern tablelands and north coast of NSW, but is never common. Also found from Japan to central Eurasia.	**Unlikely**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
				Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps.	Suitable habitat was unlikely to be present within the site. No known records within the vicinity of the site.
Dichanthium setosum Bluegrass	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.	**Unlikely** Suitable habitat was unlikely to be present within the site. No known records within the vicinity of the site.
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.
Rutidosis heterogama Heath Wrinklewort	V	V	No	Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides. Recorded from near Cessnock to Kurri Kurri with an outlying occurrence at Howes Valley. On the Central Coast it is located north from Wyong to Newcastle.	**Low** Marginal suitable habitat was present near the road reserve.
Tetratheca juncea Black-eyed Susan	V	V	No	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. Found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest.	**Unlikely** The site lacks common flora associations. No known nearby records.
Angophora inopina Charmhaven Apple	V	V	No	Endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. There is an unconfirmed record of the species near Bulahdelah. Approximately 1250 ha of occupied habitat has been mapped in the Wyong–southern Lake Macquarie area. Grows in open woodland with a dense shrub understorey on deep white sandy soils over sandstone.	**Unlikely** No suitable habitat was present.
Eucalyptus camfieldii Camfield's Stringybark	V	V	No	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	**Unlikely** The site lacks common flora associations. No known nearby records.
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 and known to occur at

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
					Paterson. No records within 10km of subject land.
Eucalyptus parramattensis subsp. *decadens* Drooping Red Gum	V	V	No	Generally, occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. In the Kurri Kurri area, *E. parramattensis* subsp. *decadens* is a characteristic species of 'Kurri Sand Swamp Woodland and in the Tomago Sandbeds area, the species is usually associated with the 'Tomago Swamp Woodland'.	**Unlikely** No suitable habitat was present.
Melaleuca biconvexa Biconvex Paperbark	V	V	No	Only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Grows in damp places, often near streams; coastal districts and adjacent tablelands from Jervis Bay north to the Port Macquarie district.	**Unlikely** No suitable habitat was present.
Rhodamnia rubescens Scrub Turpentine	E4A		Yes	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	**Unlikely** No suitable habitat was present.
Rhodomyrtus psidioides Native Guava	E4A		Yes	Occurs from Broken Bay New South Wales to Maryborough in Queensland. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	**Unlikely** No suitable habitat was present.
Syzygium paniculatum Magenta Lilly Pilly	E1	V	No	Occurs in a narrow coastal distribution in rainforests on sandy soils or stabilised coastal dunes from Jervis Bay to Bulahdelah in NSW.	**Unlikely** No suitable habitat was present.
**Euphrasia arguta* Eyebright	E4A	CE	Yes	Found within the Nundle area reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	**Unlikely** No suitable habitat was present. No known nearby records.
Persicaria elatior Tall Knotweed	V	V	No	Recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertsocaleyin, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	**Low** Marginal suitable habitat was present around the margins of the tributaries.
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea	V	V	No	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest and is found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Common canopy	**Low** Marginal habitat was present. No nearby records.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
				species vary greatly with community type but generally are species that favour soils with a strong lateritic influence including *Eucalyptus fibrosa*, *E. parramattensis, Angophora bakeri* and *Eucalyptus sclerophylla*.	
Commersonia prostrata Dwarf Kerrawang	E1	E	No	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (E*. haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago.	**Unlikely** No suitable habitat was likely to be present.
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 likely to be present.
Asperula asthenes Trailing Woodruff	V	V	No	Occurs in damp sites, often along river banks.	**Unlikely** No suitable habitat was likely to be present.
Thesium australe Austral Toadflax	V	V	No	Grows in grassland or woodland, often in damp sites.	**Unlikely** No suitable habitat was likely to be present.
FAUNA - AMPHIBIANS					
Litoria aurea Green and Golden Bell Frog	E1	V	No	Inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins.	**Low** Tributaries of Deadman's Creek was present within the subject land.
Mixophyes balbus Stuttering Frog	E1	V	Yes	Occurs in wet forest regions of south-eastern Queensland, Eastern NSW and Victoria. In late spring, eggs are deposited among leaf litter on the banks of streams and subsequently are washed into the water during heavy rain.	**Low** Only marginal habitat was present.
Uperoleia mahonyi Mahony's Toadlet	E1		No	Current observations indicate Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Commonly associated with acid paperbark swamps, Mahony's Toadlet also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Recent studies suggest intact vegetation adjacent to and within water bodies is an important habitat feature for this species.	**Unlikely** No suitable habitat was present.
FAUNA - REPTILES					

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
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.	**Unlikely** No suitable habitat was likely to be present. No nearby records
FAUNA - BIRDS					
Actitis hypoleucos Common Sandpiper		M	No	Shallow pebbly, muddy or sandy edges of rivers and streams, coastal and inland; dams, lakes, sewage ponds, margins of tidal rivers, waterways in mangroves or saltmarsh; mudflats; rocky or sandy beaches.	**Low** Given the broad habitat for this species the tributaries of Deadman's Creek located within the subject land may provide habitat for this species.
Calidris acuminata Sharp-tailed Sandpiper		M	No	Tidal mudflats, saltmarshes, mangroves; shallow fresh, brackish or saline inland wetlands; sewage ponds and irrigated pastures.	**Unlikely** No suitable habitat was present.
Calidris ferruginea Curlew Sandpiper	E	CE	Yes	Tidal mudflats; saltmarsh; fresh, brackish or saline wetlands; sewage ponds.	**Unlikely** No suitable habitat was present.
Calidris melanotos Pectoral Sandpiper		M	No	The Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	**Unlikely** No suitable habitat was present.
Gallinago hardwickii Latham's Snipe		M	No	Utilises a variety of habitats, such as soft wet ground or shallow water with tussock and other green and dead vegetation, and scrub or open wetland from sea-level to alpine bogs (Pizzey & Knight, 2001).	**Low** Habitat was located to the west of the impact area.
Limosa lapponica baueri Bar-tailed Godwit		V & M	No	Most frequently recorded along major coastal river estuaries and sheltered embayments, particularly the Tweed, Richmond, Clarence, Macleay, Hastings, Hunter and Shoalhaven River estuaries, Port Stephens and Botany Bay. Found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	**Unlikely** No suitable habitat was present.
Numenius madagascariensis Eastern Curlew		CE M	Yes	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes.	**Unlikely**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
					No suitable habitat was present.
Tringa nebularia Common Greenshank				Inhabits a wide variety of inland permanent and temporary wetlands and sheltered coastal habitats of varying salinity.	**Unlikely** No suitable habitat was present.
Charadrius leschenaultii Greater Sand-plover	V		No	In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	**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.	**Low** Suitable habitat was present around the drainage lines.
Cuculus optatus Oriental Cuckoo		M	No	Inhabits a range of forests, typically feeding on insects and larvae.	**Low** Due to the non-specific habitat requirements of this species habitat was considered to be present.
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.	**Low** Suitable habitat was present around the drainage lines.
Ephippiorhynchus asiaticus Black-necked Stork	E1		No	Widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW. Breeding has been recorded as far south as Tomago NSW.	**Unlikely** No suitable habitat was present.
Anseranas semipalmata Magpie Goose	V		No	Relatively common in the Australian northern tropics. Records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	**Low** Marginal suitable habitat was located in the tributaries of Deadman's Creek that traverse the subject land.
Apus pacificus Fork-tailed Swift		M	No	Inhabits the airspace over open country from semi deserts to coasts.	**Moderate** Due to the non-specific habitat requirements of this species habitat was considered to be present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
Irediparra gallinacea Comb-crested Jacana	V		No	Occurs in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW. Inhabits permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially waterlilies, or fringing and aquatic vegetation.	**Unlikely** No suitable habitat was present.
Sternula nereis nereis Australian Fairy Tern		V	No	Nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	**Unlikely** No suitable habitat was present.
Ptilinopus magnificus Wompoo Fruit-Dove	V		No	Occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. Found in, or near rainforest, low elevation moist eucalypt forest and brush box forests.	**Unlikely** No suitable habitat was present.
Calyptorhynchus lathami 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.
Callocephalon fimbriatum Gang Gang Cockatoo	V		No	Tall montane forests and woodlands in mature wet sclerophyll forests. Requires hollows in which to breed between October and January.	**Low** Marginal habitat was present.
Lathamus discolor Swift Parrot	E1	CEM	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.
Neophema chrysostoma Blue-winged Parrot		V	No	Inhabits a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones. Favours grasslands and grassy woodlands. Often found near wetlands both near the coast and in semi-arid zones. Can also be seen in altered environments such as airfields, golf-courses and paddocks.	**Low** Due to the non-specific habitat requirements of this species habitat was considered to be present.
Neophema pulchella Turquoise Parrot	V		No	Lives on the edges of Eucalypt woodland adjoining clearings and on timbered ridges and creeks in farmland. It has also been recorded utilising roadside verges and orchards. Nests in small hollow branches of Eucalypts.	**Low - Moderate** Foraging habitat was present.
Glossopsitta pusilla Little Lorikeet	V		No	Tall Open Forests, woodlands, orchards, parks and street trees.	**Moderate - High** Foraging habitat was present.
Hirundapus caudacutus White-throated Needletail		V & M	No	Inhabits the airspace above forests, woodlands, farmlands, plains, lakes, coasts and towns.	**Moderate**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
					Due to the non-specific habitat requirements of this species habitat was considered to be 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.
Monarcha melanopsis Black-faced Monarch		M	No	Utilises a range of habitats including rainforests, eucalypt woodlands, coastal scrubs (Pizzey & Knight, 2001).	**Low** Marginal habitat was present.
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch		M	No	Wet forests, thickly wooded gullies, waterside vegetation and mangroves.	**Unlikely** Suitable wet forest vegetation was not present on site for this species.
Pycnoptilus floccosus Pilotbird		V	No	Found in wet forested areas and heathland in eastern Victoria and south-eastern New South Wales	**Unlikely** No suitable habitat was present.
Epthianura albifrons White-fronted Chat	V		No	In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Gregarious species usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	**Unlikely** No suitable habitat was present.
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	V		No	Eucalypt woodlands, Acacia scrublands, Banksia dominated coastal scrubs and open forests.	**Low** Marginal 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.
Myiagra cyanoleuca Satin Flycatcher		M	No	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	**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		
Rhipidura rufifrons Rufous Fantail		M	No	Utilises a range of habitats including rainforests, wet sclerophyll forests, monsoon forests, scrubs, mangroves, watercourses, parks and gardens. During migration this species also utilises farms, street trees and buildings.	**Moderate** Transitory habitat was present.
Climacteris picumnus victoriae Brown Treecreeper	V	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.	**Low** Foraging habitat was present.
Stagonopleura guttata Diamond Firetail	V		No	Inhabits areas with a grassy, shrubby understorey including Eucalypt woodlands, forests, Acacia scrubs and mallee.	**Low-Moderate** Foraging habitat was present.
Motacilla flava Yellow Wagtail		M	No	Habitat includes paddocks, and marshes. Open country near swamps, salt marshes, sewerage ponds, grassed surrounds to airfields, bare ground; occasionally on drier inland plains. Rare but regular visitor around the Australian coast, especially the NW coast; Broome to Darwin.	**Unlikely** No 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.	**High** Suitable habitat was present and recent nearby records.
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	CEM	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		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.
Daphoenositta chrysoptera Varied Sittella	V		No	Open eucalypt woodland/forest, mallee, inland acacia, coastal tea-tree scrubs, golf courses, orchards and parks.	**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		
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. Found in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land.	**Low** Marginal habitat was present.
Pandion cristatus Eastern Osprey	V		No	Found right around the Australian coastline. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over open waters.	**Unlikely** No suitable habitat for this species
Lophoictinia isura Square-tailed Kite	V		No	Inhabits open forests and woodlands, particularly those on fertile soils with abundant passerines.	**Low** Nesting habitat is available for this species across the site.
Erythrotriorchis radiatus Red Goshawk	E4A	E	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.
Haliaeetus leucogaster White-bellied Sea-Eagle	V	M	No	Occupies habitat characterised by the presence of large areas of open water and feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans. The nests are built in a variety of sites including tall trees, bushes, mangroves, cliffs, rocky outcrops, caves, crevices, on the ground or even in artificial structures.	**Low** This species could potentially utilise the subject land for nesting with suitable hunting habitat in the form of the Williams River being located approximately 2.4km to the east of the subject land.
Falco hypoleucos Grey Falcon	E1		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.	**Unlikely** This species is unlikely to utilise the site.
Falco subniger Black Falcon	V		No	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions.	**Low** Habitat is available for this species across the site.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
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.	**Moderate** Hunting and roosting/r nesting habitat was present.
Tyto longimembris Eastern Grass Owl	V		No	This species roost and nest on the ground, in crops or in thick grass tussock often associated with swamps.	**Unlikely** No suitable habitat was present.
FAUNA – MAMMALS					
Dasyurus maculatus ssp. *maculatus* Spotted-tailed Quoll	V	V	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-Moderate** Habitat is available for this species across the site.
Phascogale tapoatafa Brush-tailed Phascogale	V		No	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter.	**High** Suitable habitat was present for this species. Nearby records of this species.
Phascolarctos cinereus Koala	V	V	No	Coastal woodland and open forest containing suitable food trees.	**Potentially Known** Koala are known to occur within the locality. Pock marks were observed on the boles of some specimens of *Melaleuca nodosa,* however it was difficult to determine if they were caused by Koala or possum.
Petrogale penicillata Brush-tailed Rock-wallaby	E1	V	Yes	Found in steep rocky sites in sclerophyll forests with a grassy understorey.	**Unlikely** No suitable habitat was present.
Macropus 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 nearby records of this species.
Potorous tridactylus sp. *tridactylus* Long-nosed Potoroo	V	V	No	This species is known from a variety of habitats, including Rainforest, Open Forests and Woodlands with dense groundcover, and dense, wet coastal heathlands. Soft (often sandy) substrates are preferred by this species.	**Unlikely** No preferred habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SITE
	BC Act 2016	EPBC Act 1999	SAII		
Petaurus australis Yellow-bellied Glider	V	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 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.	**Low** Only marginal habitat was present.
Petaurus norfolcensis Squirrel Glider	V		No	Dry sclerophyll forests and woodlands with exudates for foraging and hollows for nesting.	**High** Marginal habitat for this species was present.
Petauroides volans Greater Glider		V	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.
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.
Pteropus poliocephalus Grey-headed Flying-Fox	V	V	No	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	**High** Seasonal foraging habitat was available in the form of flowering myrtaceous canopy species. Nearby records of 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** Suitable hunting habitat were present.
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	V		No	Appears to live in sclerophyll forests and woodland. Roosts in tree hollows or under loose bark.	**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.	**Known** Recorded within the study area during surveys. Suitable roosting and hunting habitat was present.
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-Moderate** Tributaries of Deadman's Creek were present within the subject land. Preferred roosting habitat in the form of caves was absent.
Chalinolobus dwyeri Large 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.

5.4 FAUNA APPRASIAL RESULTS

5.4.1 DIURNAL SURVEYS

Amphibians

During surveys the amphibian species *Crinia signifera* (Common Eastern Froglet) was heard calling within the tributaries of Deadman's Creek within the subject land.

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:

- *Alisterus scapularis* (Australian King Parrot);
- *Corvus coronoides* (Australian Raven);
- *Manorina melanocephala* (Noisy Miner);
- *Cracticus tibicen* (Australian Magpie);
- *Grallina cyanoleuca* (Magpie-lark);
- *Platalea regia* (Royal Spoonbill);
- *Chenonetta jubata* (Australian Wood Duck);
- *Anas superciliosa* (Pacific Black Duck);
- *Phalacrocorax sulcirostris* (Little Black Cormorant);
- *Malurus cyaneus* (Superb Fairywren);
- *Platycercus elegans* (Crimson Rosella).

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

A number of mammals were found to utilise the study area during surveys. Anabat surveys detected *Miniopterus australis* (Little Bentwing Bat) and *Austronomus australis* (White-striped Freetail Bat) utilising the study area. *A. australis* was also heard during the spotlighting survey. During the spotlighting survey numerous specimens of *Trichosurus vulpecula* (Common Brushtail Possum) were observed within the large patch of PCT 3433. One specimen of *Pseudocheirus peregrinus* (Eastern Ringtail Possum) was observed during the spotlighting survey within PCT 4042 in the third order drainageline. The study area also contained scats consistent Macropod. Camera traps showed specimens of *Trichosurus vulpecula* (Common Brushtail Possum), within the study area.

Pock marks on the boles of trees was recorded during fieldwork. It was difficult to determine if these were caused by Common Brushtail Possum, which was observed in large numbers within the subject land, or was evidence of one threatened species, *Phascolarctos cinereus* (Koala). No scats associated with this species was observed at the base of surveyed trees. Due to a number of local records within the last 5 years within 1km of the subject land and the presence of the Koala Food Tree species *Eucalyptus tereticornis,* the precautionary principle was taken and it was assumed *P. cinereus* was recorded within the study area.

Little Bentwing Bat and Koala have been assessed under the BC Act 2016 in Section 7.0 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 the most disturbance from historic vegetation removal and current livestock grazing. The cable route has been proposed adjacent to the western boundary fenceline on the fringe of the patch of PCT 3433 to minimise tree removal. The proposed cable will be installed by underbore within the location of PCT 4042. The underbore pit points will be located located within non-native paddock vegetation outside the riparian zone of the stream.

6.2 DIRECT IMPACT

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

- Removal of up to 0.36ha of highly disturbed PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- Removal of up to 0.36ha of highly disturbed example of the EEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions;
- Removal of up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees;
- Removal of up to four hollow-bearing trees;
- Removal of up to 35 trees (Appendix B), including up to 15 CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis* and the trimming of one limb from Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark);
- Removal of known habitat for *Miniopterus australis* (Little Bentwing Bat);
- Removal of known habitat for the *Phascolarctos cinereus* (Koala);
- 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:

Trees and other Native Vegetation

Where possible, works should minimise any impact to native vegetation outside the scope of the proposal. 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 and *Miniopterus australis* (Little Bentwing Bat)

- 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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014).
- 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.

Lower Hunter Spotted Gum—Ironbark Forest in the NSW North Coast Bioregion

Approximately 0.36ha of the EEC Lower Hunter Spotted Gum - Ironbark Forest in the NSW North Coast Bioregion 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.

Phascolarctos cinereus (Koala)

- Avoid the removal of the preferred Koala Feed Tree Species *Eucalyptus tereticornis* wherever possible;
- Pre-clearance searches are to be undertaken prior to the removal of vegetation to look for Koalas and any other fauna that may be present. If a Koala is located then works are to stop until the koala vacates the impact areas by at least 100m on its own accord prior to works recommencing.
- The proposal includes the construction of an access road. Speed limit of this road should be restricted to 20km/h in order to minimise the risk of injury or fatality to any koalas as a result of motor vehicles.
-

Koala Food Tree replacement requirement under the Port Stephens Council Tree Technical Specification

Listed CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) removed as a result of the proposal will be replaced according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014) and Table 8.1 within this report.

Taking these replacement ratios into account, up to 140 replacement Koala Feed Tree Species plantings would be required. There is scope for replacement plantings within the subject land.

Replacement food trees must be:

a. of the same species: (i.e. *Eucalyptus tereticornis*);
b. sourced from local provenance seed stock;
c. planted in a cluster and, where feasible, in the vicinity of any retained food trees;
d. protected, nurtured and maintained until the trees have reached a mature height of 5 metres;
e. Any replacement trees that die before maturity must be replaced.

Undertake general weed control within the site.

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 remaining 25 flora species assessed, the subject land was found to contain suitable habitat for 6 of the addressed species:

- *Pterostylis chaetophora* (Tall Rustyhood);
- *Rhizanthella slateri* (Eastern Underground Orchid)
- *Rutidosis heterogama* (Heath Wrinklewort);
- *Eucalyptus glaucina* (Slaty Red Gum)
- *Persicaria elatior* (Tall Knotweed);
- *Grevillea parviflora* subsp. *parviflora* (Small-flowered Grevillea)

Of these addressed threatened flora species the most likely to occur within the subject land area would include *Pterostylis chaetophora* (Tall Rustyhood) and *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

Miniopterus australis (Little Bentwing Bat) was positively identified within the subject land during the Anabat survey. Pock marks on the boles of trees was recorded during fieldwork. It was difficult to determine if these were caused by Common Brushtail Possum, which was observed in large numbers within the subject land, or was evidence of one threatened species, *Phascolarctos cinereus* (Koala). No scats associated with this species was observed at the base of surveyed trees. Due to a number of local records within the last 5 years within 1km of the subject land and the presence of the Koala Food Tree species *Eucalyptus tereticornis,* the precautionary principle was taken and it was assumed *P. cinereus* was recorded within the study area.

Phascolarctos cinereus (Koala)

Suitable habitat was found to be present across the subject land within areas of woodland. One preferred feed tree species *Eucalyptus tereticornis* (Forest Red Gum) listed under the Port Stephens CKPoM was present within the subject land. As a result of the CKPoM assessment the impact area was found to contain approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.65ha of mainly cleared land. Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat.

Fieldwork suggests that the study area may be utilised occasionally by a small number of Koalas as part of a much larger are of habitat, however there was no evidence of recent activity in the form of scats.

The proposal will result in the removal of approximately 0.13ha of Preferred Koala Habitat. No areas of habitat are likely to become significantly fragmented or isolated from other areas of habitat as a result of the proposed action. A number of recommendations including the retention of Preferred Koala Habitat wherever possible, planting of compensatory Koala Feed Trees and allowing the safe movement of Koalas through the site have been given to help reduce the impact of the development on the Koala (Section 8.0). Taking the recommendations into consideration it is less likely that the proposal will disrupt the life cycle of the Koala such that local extinction would occur.

Miniopterus australis (Little Bentwing Bat)

M. australis was positively identified within the site during the microchiropteran bat call survey. The entire site is likely to contain suitable roosting habitat in the form of tree hollows and hunting and habitat for this microchiropteran bat species. Preferred roosting habitat in the form of caves was absent within the site, however man-made structures in the form of two dwellings and associated infrastructure were located within the subject land. The removal of vegetation and up to 4 hollow-bearing trees from this

site may result in an incremental loss in the quality of hunting and roosting habitat in the local area. Taking into consideration the relatively large amount of suitable hunting and roosting habitat retained within the subject land and within the local area, the absence of preferred roosting habitat within the site and the recommendation for compensatory nest boxes the proposal is unlikely to disrupt the life cycle of *M. australis* such that local extinction would occur.

Of the 52 remaining addressed threatened fauna species the subject site was considered to contain suitable habitat for 35 species:

- *Litoria aurea* Green and Golden Bell Frog
- *Mixophyes balbus* Stuttering Frog
- *Anseranas semipalmata* Magpie Goose
- *Calyptorhynchus lathami* Glossy Black-Cockatoo
- *Lathamus discolor* Swift Parrot
- *Neophema chrysostoma* Blue-winged Parrot
- *Neophema pulchella* Turquoise Parrot
- *Glossopsitta pusilla* Little Lorikeet
- *Callocephalon fimbriatum* Gang Gang Cockatoo
- *Artamus cyanopterus cyanopterus* Dusky Woodswallow
- *Melanodryas cucullata cucullata* Hooded Robin (south-eastern form)
- *Petroica boodang* Scarlet 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
- *Daphoenositta chrysoptera* Varied Sittella
- *Haliaeetus leucogaster* White-bellied Sea-Eagle
- *Lophoictinia isura* Square-tailed Kite
- *Hieraaetus morphnoides* Little Eagle
- *Falco subniger* Black Falcon
- *Ninox strenua* Powerful Owl
- *Dasyurus maculatus ssp. maculatus* Spotted-tailed Quoll
- *Petaurus norfolcensis* Squirrel Glider
- *Phascogale tapoatafa* Brush-tailed Phascogale
- *Petaurus australis* Yellow-bellied Glider
- *Pteropus poliocephalus* Grey-headed Flying-Fox
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Micronomus norfolkensis* East Coastal Free-tailed Bat
- *Miniopterus orianae oceanensis* Large Bentwing-bat
- *Myotis macropus* Southern Myotis
- *Chalinolobus dwyeri* Large Pied 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 – Lower Hunter Spotted Gum—Ironbark Forest in the NSW North Coast Bioregion. This EEC is tenuously connected to a larger remnant area of similar vegetation surrounding the subject land. As a result of the proposal, an area of approximately 0.36ha of highly disturbed Lower Hunter Spotted Gum—Ironbark Forest will be removed, which includes the removal of up to 35 trees; a total of (24 trees will require removal, up to 10 trees are likely to require removal and one tree is uncertain if it requires removal) and the trimming of one limb from Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark). 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 Lower Hunter Spotted Gum—Ironbark Forest in the NSW North Coast Bioregion 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 0.36ha of highly disturbed PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- Removal of up to 0.36ha of highly disturbed example of the EEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions;
- Removal of up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees;
- Removal of up to four hollow-bearing trees;
- Removal of up to 35 trees (Appendix B), including up to 15 CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) and the trimming of one limb from Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark);
- Removal of known habitat for *Miniopterus australis* (Little Bentwing Bat);

- Removal of known habitat for the *Phascolarctos cinereus* (Koala);
- 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 35 trees and the trimming of one limb from Tree No. 46 (a specimen of *Eucalyptus siderophloia* Grey Ironbark) which will result in the loss of a small amount of habitat for those threatened species with potential habitat on site. Areas of habitat to be removed are important due to the presence of the threatened species *Miniopterus australis* (Little Bentwing Bat) and potential presence of *Phascolarctos cinereus* (Koala), as well as potential habitat of varying quality for 35 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	Four hollow-bearing trees were recorded within the development footprint and all 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

Key Threatening Process	Applicability in regards to the subject land
	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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014). 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 *Sporobolus africanus (Parramatta Grass)* were present within the road reserve of the subject land. The 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. The proposed development will increase edge effects to a small portion of the vegetation present along the western boundary of the study area. This vegetation is currently disturbed and will remain connected to other areas of higher condition vegetation and as such any increased edge effects are expected only to result in negligible impacts.
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)	The Red Fox was not recorded during surveys within the subject land 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 numbers of this introduced species.
Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)	Noisy miners were recorded within the study area. 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 recorded within the 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. 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 observed within the study area. Any occurrences of this weed should be managed as part of routine property maintenance.

8.0 KOALA HABITAT ASSESSMENT UNDER THE PORT STEPHENS COMPREHENSIVE KOALA PLAN OF MANAGEMENT

The Port Stephens Comprehensive Koala Plan of Management (CKPoM) has been prepared for the Port Stephens LGA in accordance with SEPP 44-'Koala Habitat Protection'. The aim of the CKPoM is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline.

Koala Habitat Assessments under the Port Stephens CKPoM involve four stages: preliminary assessment, vegetation mapping, Koala habitat identification and assessment of the proposal. A Koala habitat assessment has been completed below specifically for this proposed subdivision.

8.1 PRELIMINARY ASSESSMENT

The preliminary assessment for the site involves reviewing the Koala Habitat Planning Map for the area as contained in the CKPoM and undertaking a site inspection to determine whether the site contains individuals of Koala trees outside areas marked as 'Preferred Koala Habitat'.

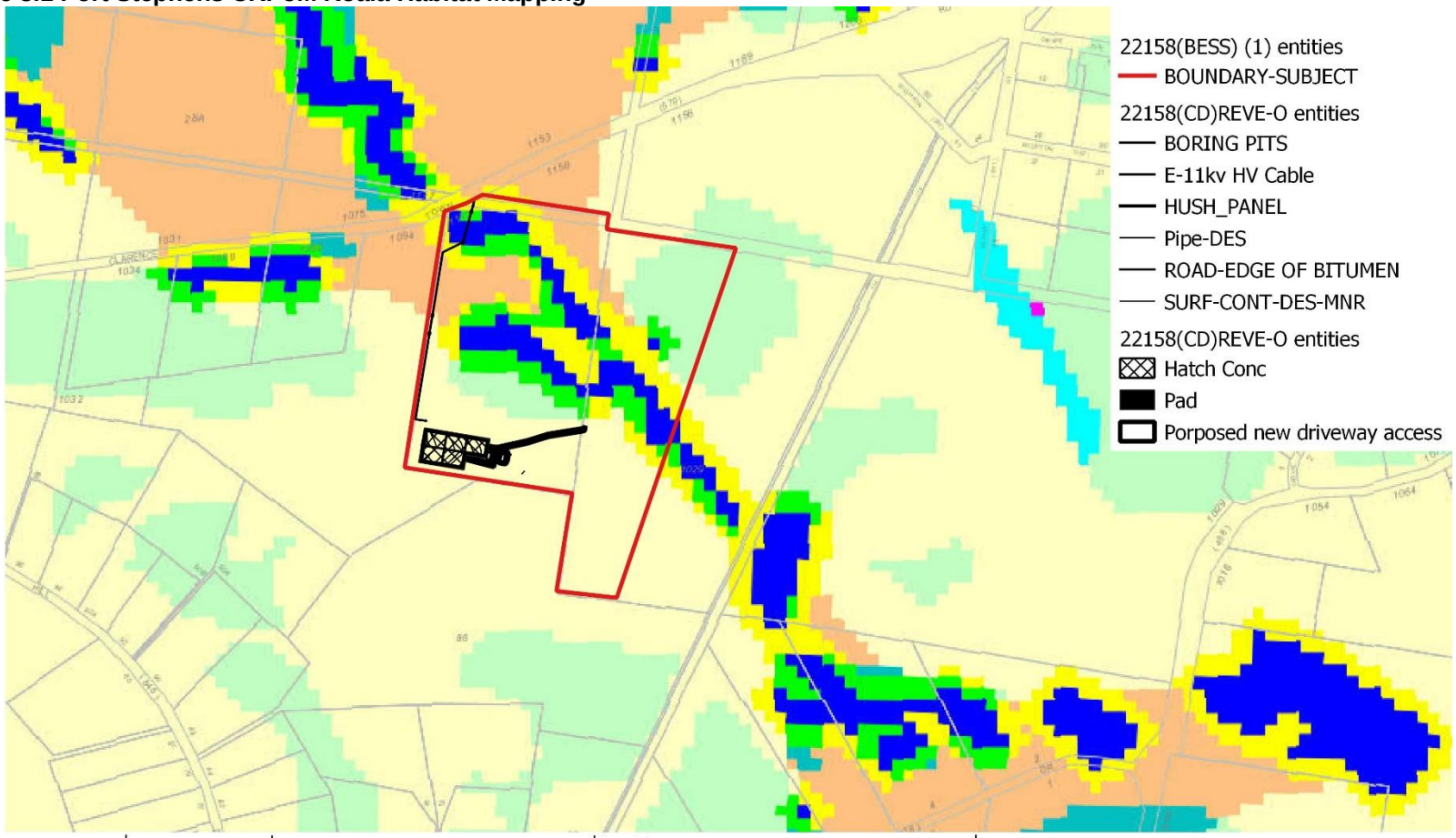
A review of Figure 22 – 'Port Stephens Council - Koala Habitat Planning Map' showed that the site contained six habitat categories:

- Preferred - 4.79ha
- 50m Buffer over Marginal - 3.94ha
- 50m Buffer Over Cleared - 5.85ha
- Link Over Cleared - 3.42ha
- Marginal - 5.49ha
- Mainly Cleared - 13.62ha

The majority of the proposed impact was located within 'Mainly Cleared' mapped habitat (Figure 8.1). Preferred Koala Habitat and buffers followed the vegetation lining the tributaries located within the subject land.

Within the CKPoM there are three species of Eucalypt identified as Koala food trees, being *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus parramattensis* subsp. *decadens* (Drooping Red Gum) and *Eucalyptus tereticornis* (Forest Red Gum). One species of CKPoM Koala feed tree *Eucalyptus tereticornis* (Forest Red Gum) was found within the site. The area mapped as Marginal Koala Habitat occurring in the study area was found to have a low density of specimens of *E. tereticornis*.

Figure 8.1 Port Stephens CKPoM Koala Habitat Mapping



8.2 VEGETATION MAPPING

The next step in the Koala Habitat Assessment is to provide a description of the vegetation assemblages present on site to compare the results of the vegetation survey conducted for this report with the LGA wide vegetation (Figure 2.4 - 'Western Section Vegetation' in Part 2 of the Port Stephens CKPoM).

As detailed in Section 4.1, three vegetation assemblages were found to be present on site as a result of an on ground assessment:

- PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest;
- PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest;
- Grazed exotic groundcover with scattered trees;
- Managed Roadside Grassland.

Review of the relevant LGA vegetation map (Figure 2.4 in Part 2: CKPoM Resource Document) showed the study area supports the following vegetation type;

- Map Unit 7b - 'Forest Red Gum and Grey Box Open Forest' occurring in the east of the site

Map Unit 7b was mapped within the tributaries present within the subject land. Site vegetation surveys found that vegetation communities on site were consistent with those identified above in the north and southwest of the subject land. Mapping, however was not consistent with Mainly Cleared habitat in the south. Whilst there was a significant portion of 'Mainly Cleared (Some Trees)' occurring in the south of the site, the large patch of PCT 3433 was consistent with Map Unit 5 - 'Spotted Gum and Ironbark Open Forest'. There was a very low density of *E. tereticornis* (Forest Red Gum) within this area. Two areas of PCT 3433 in the south west and central south of the subject land, however had a high proportion of *E. tereticornis*.

8.3 KOALA HABITAT IDENTIFICATION

Koala Habitat Identification involves:

(i) the application of the definitions of Preferred and Supplementary Koala Habitat detailed by Lunney *et al*. (1998) to the study area;

The definitions provided by Lunney *et al.* (1998) are as follows:

- Preferred Koala Habitat - a combination of field survey Primary or Secondary and Community Survey category A/B (regardless of whether or not they overlap).
- Supplementary Koala Habitat - where field survey Marginal and community survey category C/D overlap
- Marginal Koala Habitat - where field survey Marginal and community survey category E overlap

Primary Koala habitat vegetation associations are those where the dominant or co-dominant tree species were preferred by Koalas and showed a level of use that was density independent. Secondary

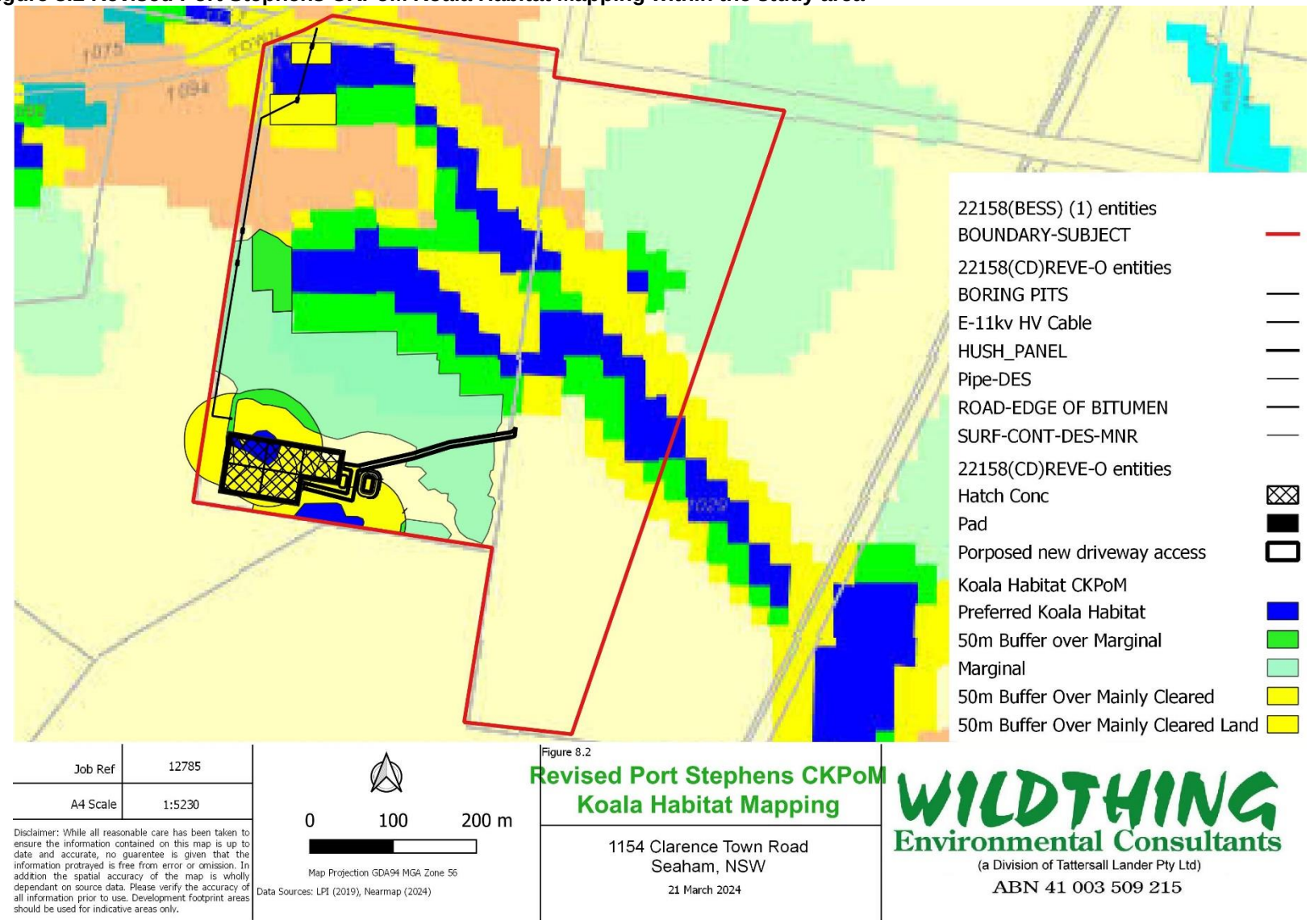
Koala Habitat vegetation associations occur where preferred tree species constituted between 10% and 35% of the overstorey vegetation. Marginal Koala Habitat vegetation associations are those which contain low densities of species known to be preferred by Koalas.

Field Survey

Eucalyptus tereticornis (Forest Red Gum) was found to be the most dominant canopy species within two patches of mapped PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest. Within these two patches of PCT 3433 occurring in the south of the study area was found to be most consistent with Community Survey Category E - Open Forest Redgum and Spotted Gum Forest. Under the definition provided by Lunney *et al.* (1998) based on field work, the forested area within the study area is most consistent with the Map based survey - Secondary Koala Habitat category "vegetation associations on erosional landscapes supporting *E. tereticornis* as a sub-dominant component of the overstorey." When the map survey Secondary and Community Survey - E overlap, under the definitions provided by Lunney *et al.* (1998), Preferred Koala Habitat is obtained.

Within the largest mapped patch of PCT 3433 *E. tereticornis* was unlikely to constitute 15% of the canopy species. There was a very low density of *E. tereticornis* (Forest Red Gum) within this area. This area together with a large portion of the site was consistent with Map Unit 5 - 'Spotted Gum and Ironbark Open Forest'

Figure 8.2 Revised Port Stephens CKPoM Koala Habitat Mapping within the study area



8.4 ASSESSMENT OF THE PROPOSAL

There are eight performance criteria applied to developments proposed on sites that contain or are adjacent to 'Preferred Koala Habitat', Supplementary Koala Habitat', 'Habitat Buffers', 'Habitat Linking Areas' or areas that contain preferred Koala feed tree species. Each criterion is displayed below in italics followed by the site-specific answer.

The proposed development must:

a) *Minimise the removal or degradation of native vegetation within Preferred Koala Habitat or Habitat Buffers*

The impact area contains approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land. Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat.

It is recommended that the proposal avoids the removal of specimens of *E. tereticornis* wherever possible.

Opportunity exists to compensate the removal of specimens of *E. tereticornis* within the subject land for the purposes of compensatory plantings. Listed CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) removed as a result of the proposal will be replaced according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014) and Table 8.1 within this report.

Table 8.1: Replacement Koala Food Tree Requirement under the Port Stephens Council Tree Technical Specification

Koala food tree size class (dbh)	Replacement Ratio (loss:gain)	*Eucalyptus tereticornis* required replacement
<100 mm	1:6	-
100-300 mm	1:8	40
>300 mm	1:10	100

Taking these replacement ratios into account up to 140 replacement Koala Feed Tree Species plantings would be required. There is scope for replacement plantings within the subject land.

Replacement food trees must be:
a. of the same species: (i.e. *Eucalyptus tereticornis*);
b. sourced from local provenance seed stock;
c. planted in a cluster and, where feasible, in the vicinity of any retained food trees;
d. protected, nurtured and maintained until the trees have reached a mature height of 5 metres;
e. Any replacement trees that die before maturity must be replaced.

Undertake general weed control within the site.

b) Maximise retention and minimise degradation of native vegetation within Supplementary Koala Habitat and Habitat Linking Areas;

No areas of Supplementary Koala Habitat were identified within the site. 0.03ha of link over cleared will require disturbance to install the cable. The majority of linking habitat within the subject land will be retained in the scope of the proposal.

c) Minimise the removal of any individuals of preferred Koala food trees, wherever they occur on a development site. In the Port Stephens LGA these tree species are Eucalyptus robusta (Swamp Mahogany), Eucalyptus parramattensis (Parramatta Red Gum) and Eucalyptus tereticornis (Forest Red Gum);

It is recommended that the proposal avoids the removal of specimens of *E. tereticornis* wherever possible.

Opportunity exists to compensate the removal of specimens of *E. tereticornis* within the subject land for the purposes of compensatory plantings. Listed CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) removed as a result of the proposal will be replaced according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014) and Table 8.1 within this report. Taking these replacement ratios into account up to 140 replacement Koala Feed Tree Species plantings would be required. There is scope for replacement plantings within the subject land.

d) Make provisions, where appropriate, for restoration or rehabilitation of areas identified as Koala Habitat including Habitat Buffers and Habitat Linking Areas over Mainly Cleared Land;

It is recommended that any removal of *E. tereticornis* within the site is compensated with replacement trees at a ratio of two *E. tereticornis* trees for each one removed. It is also recommended that specimens of *E. tereticornis* be used for additional tree plantings within the site use.

e) Make provisions for long term management and protection of Koala habitat including both existing and restored habitat;

It is recommended that a Vegetation Management Plan be completed for the site. The plan will include the removal, protection, enhancement and compensatory planting of native vegetation within the site.

f) Not compromise the potential for safe movement of Koalas across the site. This should include maximising tree retention generally and minimising the likelihood that the proposal would result in the creation of barriers to Koala movement, such as would be imposed by certain types of fencing;

The proposed project involves the installation of a Battery Energy Storage System (BESS). The proposal has been positioned to retain connectivity within the wider subject land and with neighbouring properties. The proposal is unlikely to hinder the movement of Koalas across the subject land.

g) Be restricted to identified envelopes which contain all buildings and infrastructure and fire fuel reduction zone;

Trees required for removal are to be clearly marked before any works are undertaken to prevent any unnecessary clearing. A clearance boundary line is to be clearly marked with flagging tape to prevent the removal of vegetation that should be retained within the scope of the proposal.

h) *Include measures to effectively minimise the threat posed by Koalas by dogs, motor vehicles and swimming pools.*

Pre-clearance searches are to be undertaken prior to the removal of vegetation to look for Koalas and any other fauna that may be present. If a Koala is located then works are to stop until the koala vacates the impact areas by at least 100m on its own accord prior to works recommencing. The proposal includes the construction of an access road. Speed limit of this road should be restricted to 20km/h in order to minimise the risk of injury or fatality to any koalas as a result of motor vehicles. The proposal will not result in the installation of swimming pools or an increase in dogs.

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:

- *Caladenia tessellata* (Thick-lipped Spider-orchid);
- *Prasophyllum* sp. Wybong (A Leek Orchid);
- *Rhizanthella slateri* (Eastern Underground Orchid);
- *Rhodamnia rubescens* (Scrub Turpentine)
- *Rhodomyrtus psidioides* (Native Guava)
- *Euphrasia arguta* (Eyebright)
- *Mixophyes balbus* (Stuttering Frog)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Numenius madagascariensis* (Eastern Curlew)
- *Lathamus discolor* (Swift Parrot);
- *Anthochaera phrygia* (Regent Honeyeater);
- *Erythrotriorchis radiates* (Red Goshawk);
- *Petrogale penicillata* (Brush-tailed Rock-wallaby)
- *Miniopterus australis* (Little Bentwing-bat);
- *Chalinolobus dwyeri* (Large Pied Bat);

Table 9.1: SAII impact evaluation

Potential SAII Entities	Impact Evaluation	Impact Thresholds	Serious and Irreversible Impact?
Caladenia tessellata Thick-lipped Spider-orchid	No habitat was considered present		No
Prasophyllum sp. Wybong A Leek Orchid	No habitat was considered present		No
Rhizanthella slateri Eastern Underground Orchid	No habitat was considered present		No
Rhodamnia rubescens Scrub Turpentine	No habitat was considered present		No
Rhodomyrtus psidioides Native Guava	No habitat was considered present		No
Euphrasia arguta Eyebright	No habitat was considered present		No
Mixophyes balbus Stuttering Frog	No habitat was considered present		No
Calidris ferruginea Curlew Sandpiper	No habitat was considered present		No
Numenius madagascariensis Eastern Curlew	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
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

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. Although *M. australis* was positively identified within the study area during the microchiropteran bat call survey, which is an SAII species, the subject land was only considered to

contain hunting habitat and roosting habitat in the form of tree hollows. Preferred roosting habitat in the form of caves was absent within the site. Man-made structures present within the subject land will be retained within the scope of the proposal. The proposal will require the removal of up to four hollow-bearing trees.

9.2.1 *MINIOPTERUS AUSTRALIS* (LITTLE BENTWING BAT)

M. australis was positively identified within the study area during the microchiropteran bat call survey.

Assessment under Biodiversity Conservation Regulation 2017 6.7(2):

(1) An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

a It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

The proposal requires the removal of 0.36ha of PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees, which would provide hunting habitat for *M. australis*. The proposal will also require the removal of up to four hollow-bearing trees. The entire site is likely to contain suitable hunting habitat for this microchiropteran bat species. Preferred roosting habitat in the form of caves was absent within the site. Man-made structures in the form of a dwelling and associated infrastructure was located within the subject land and will be retained within the scope of the proposal. Nest boxes are also recommended to be installed at a ratio of 2:1 per hollow-bearing tree. The removal of vegetation from this site may result in an incremental loss of hunting habitat in the local area. Taking into consideration the relatively large amount of suitable hunting habitat in the local area, the number of retained trees within the subject land containing hollows, the recommendation for the installation of nest boxes, and the absence of preferred roosting habitat within the site the proposal is unlikely to disrupt the life cycle of *M. australis* such that local extinction would occur.

b It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or

The proposal to remove of 0.36ha of PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees is unlikely to result in the reduction of population size of Little Bentwing Bat. This vegetation only provided suitable hunting habitat for this highly mobile species and an incremental number of hollow-bearing trees. There is an abundance of suitable hunting habitat and hollow-bearing trees within close proximity to the proposed impact area, including within the subject land. Taking into consideration the relatively large amount of suitable hunting habitat in the local area, the recommendation for compensatory nest boxes and the absence of preferred roosting habitat within the site the proposal is unlikely to reduce the population size of this species.

c It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographical distribution, or

The Little Bentwing Bat is a highly mobile species and does not have a very limited geographical distribution. The proposal will only require the removal of 0.36ha of PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and up to 1.40ha of Grazed Exotic Groundcover with Scattered Trees. The majority of the 37.1ha subject land was found to contain similar vegetation, which will be retained within the scope of the proposal. Impact on vegetation has been minimised by positioning the BESS and access road within an area of the subject land that contained the most disturbance from historic vegetation removal and current livestock grazing. The cable route has been proposed adjacent to the western boundary fenceline on the fringe of the patch of PCT 3433 to minimise tree removal. The proposed cable will be installed by underbore within the location of PCT 4042. The underbore points will be located outside of the mapped Biodiversity Values.

d The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

Under the Saving Our Species Strategy the key threats to the viability of landscape-managed species are loss, fragmentation and degradation of habitat, and widespread pervasive factors such as impacts of climate change and disease. . Impact on vegetation has been minimised by positioning the BESS and access road within an area of the subject land that contained the most disturbance from historic vegetation removal and current livestock grazing. The cable route has been proposed adjacent to the western boundary fenceline on the fringe of the patch of PCT 3433 to minimise tree removal and minimise hollow-bearing tree removal, which is an important roosting resource for the Little Bentwing Bat. Many hollow-bearing trees were observed within the patch of PCT 3433. Recommendations within this report to undertake routine property maintenance such as weed control will improve the quality of retained vegetation within the subject land. The installation of nest boxes would also increase roosting habitat for this species.

e Actions to avoid and minimise direct and indirect impacts

Impact on vegetation has been minimised by positioning the BESS and access road within an area of the subject land that contained the most disturbance from historic vegetation removal and current livestock grazing. The cable route has been proposed adjacent to the western boundary fenceline on the fringe of the patch of PCT 3433 to minimise tree removal and minimise hollow-bearing tree removal, which is an important roosting resource for the Little Bentwing Bat. Many hollow-bearing trees were observed within the patch of PCT 3433. The proposed cable will be installed by underbore within the location of PCT 4042. The underbore points will be located outside of the mapped Biodiversity Values.

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 within 10km 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;*

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

- Central Hunter Valley eucalypt forest and woodland
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- Lowland Rainforest of Subtropical Australia
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The ecological communities located within the site were not consistent with any nationally listed threatened ecological communities.

Fifty-eight additional 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
Botaurus poiciloptilus	Australasian Bittern
Calidris ferruginea	Curlew Sandpiper
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Charadrius leschenaultii	Greater Sand Plover
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
Numenius madagascariensis	*Eastern Curlew*
Pycnoptilus floccosus	*Pilotbird*
Rostratula australis	*Australian Painted Snipe*
Stagonopleura guttata	Diamond Firetail
Sternula nereis nereis	Australian Fairy Tern
Litoria aurea	*Green and Golden Bell Frog*
Mixophyes balbus	*Stuttering Frog*
Uperoleia mahonyi	Mahony's Toadlet
Chalinolobus dwyeri	*Large-eared Pied Bat*
Dasyurus maculatus maculatus	*Spot-tailed Quoll*
Notamacropus parma	*Parma Wallaby*
Petauroides volans	*Greater Glider (southern and central)*
Petaurus australis australis	*Yellow-bellied Glider (south-eastern)*
Petrogale penicillata	*Brush-tailed Rock-wallaby*
Phascolarctos cinereus	*Koala*
Potorous tridactylus tridactylus	*Long-nosed Potoroo (northern)*
Pseudomys novaehollandiae	*New Holland Mouse*
Pteropus poliocephalus	*Grey-headed Flying-fox*
Angophora inopina	*Charmhaven Apple*
Arthraxon hispidus	Hairy-joint Grass
Asperula asthenes	Trailing Woodruff
Caladenia tessellata	Thick-lipped Spider-orchid
Commersonia prostrata	Dwarf Kerrawang
Cryptostylis hunteriana	Leafless Tongue-orchid
Cynanchum elegans	White-flowered Wax Plant
Dichanthium setosum	bluegrass
Eucalyptus camfieldii	Camfield's Stringybark
Eucalyptus glaucina	*Slaty Red Gum*
Eucalyptus parramattensis subsp. decadens	*Earp's Gum, Earp's Dirty Gum*
Euphrasia arguta	
Grevillea parviflora subsp. parviflora	*Small-flower Grevillea*
Melaleuca biconvexa	*Biconvex Paperbark*
Persicaria elatior	*Tall Knotweed*
Pomaderris brunnea	*Rufous Pomaderris*
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	*a leek-orchid*
Pterostylis gibbosa	*Illawarra Greenhood*
Rhizanthella slateri	*Eastern Underground Orchid*
Rhodamnia rubescens	*Scrub Turpentine*
Rhodomyrtus psidioides	*Native Guava*
Rutidosis heterogama	*Heath Wrinklewort*
Syzygium paniculatum	*Magenta Lilly Pilly*
Tetratheca juncea	*Black-eyed Susan*

Thesium australe	*Austral Toadflax*
Delma impar	*Striped Legless Lizard*

One nationally threatened species *Phascolarctos cinereus* (Koala) was recorded within the study area during surveys.

***Phascolarctos cinereus* (Koala)**

Under the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (DoE, 2013) an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species*

Pock marks on the boles of trees was recorded during fieldwork. It was difficult to determine if these were caused by Common Brushtail Possum, which was observed in large numbers within the subject land, or was evidence of one threatened species, *Phascolarctos cinereus* (Koala). No scats associated with this species was observed at the base of surveyed trees. Due to a number of local records within the last 5 years within 1km of the subject land and the presence of the Koala Food Tree species *Eucalyptus tereticornis,* the precautionary principle was taken and it was assumed *P. cinereus* was recorded within the study area.

Suitable habitat was found to be present across the subject land within areas of woodland. One preferred feed tree species *Eucalyptus tereticornis* (Forest Red Gum) listed under the Port Stephens CKPoM was present within the subject land. As a result of the CKPoM assessment The impact area was found to contain approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land. . Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat.

Fieldwork suggests that the study area is utilised occasionally by a small number of Koalas as part of a much larger are of habitat, however there was no evidence of recent activity in the form of scats.

The proposal will result in the removal of approximately 0.13ha of Preferred Koala Habitat. No areas of habitat are likely to become significantly fragmented or isolated from other areas of habitat as a result of the proposed action. A number of recommendations including the retention of Preferred Koala Habitat wherever possible, planting of compensatory Koala Feed Trees and allowing the safe movement of Koalas through the site have been given to help reduce the impact of the development on the Koala (Section 8.0). Taking the recommendations into consideration it is less likely that the proposal will disrupt the life cycle of the Koala such that local extinction would occur.

- *reduce the area of occupancy of an important population*

The proposal will result in the removal of approximately 0.13ha of Preferred Koala Habitat, including up to 15 specimens of *E. tereticornis*.

- *fragment an existing important population into two or more populations*

No areas of habitat are likely to become significantly fragmented or isolated from other areas of habitat as a result of the proposed action.

- *adversely affect habitat critical to the survival of a species*

The impact area contains approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land. Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat.

It is recommended that the proposal avoids the removal of specimens of *E. tereticornis* wherever possible.

Opportunity exists to compensate the removal of specimens of *E. tereticornis* within the subject land for the purposes of compensatory plantings. Listed CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) removed as a result of the proposal will be replaced according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014) and Table 8.1 within this report. Taking these replacement ratios into account up to 140 replacement Koala Feed Tree Species plantings would be required. There is scope for replacement plantings within the subject land.

- *disrupt the breeding cycle of an important population*

The proposed project involves the installation of a Battery Energy Storage System (BESS). The proposal has been positioned to retain connectivity within the wider subject land and with neighbouring properties. The proposal is unlikely to hinder the movement of Koalas across the subject land and will still facilitate the safe movement of breeding koalas across the subject land.

- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

Due to the size and nature of the proposal, as well as the abundance of retained vegetation within the subject land, the proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that Koala is likely to decline.

- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposal is unlikely to result in an invasive species that is harmful to Koala becoming established in the endangered species' habitat

- *introduce disease that may cause the species to decline, or*

The proposal is unlikely to result in the introduction of disease that may cause Koala to decline.

- *interfere substantially with the recovery of the species.*

The majority of native vegetation will be retained within the subject land. Opportunity exists to compensate the removal of specimens of *E. tereticornis* within the subject land for the purposes of compensatory plantings. Listed CKPoM Koala food trees (15 specimens of *Eucalyptus tereticornis*) removed as a result of the proposal will be replaced according to the ratio detailed in Table 5 of Port Stephens Council Tree Technical Specification, Version 1.0. September 2014 (Port Stephens Council, 2014) and Table 8.1 within this report. Taking these replacement ratios into account up to 140 replacement Koala Feed Tree Species plantings would be required. There is scope for replacement plantings within the subject land. Considering recommendation in Section 8.0 of this report, the proposal is unlikely to interfere substantially with the recovery of the Koala.

No other 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;*

Eighteen 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:

<u>Migratory Terrestrial Species:</u>

- *Cuculus optatus* (Oriental Cuckoo)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Monarcha melanopsis* (Black-faced Monarch)
- *Motacilla flava* (Yellow Wagtail)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Rhipidura rufifrons* (Rufous Fantail)
- *Symposiachrus trivirgatus* (Spectacled Monarch)

Migratory Wetland Species:

- *Actitis hypoleucos* (Common Sandpiper)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris melanotos* (Pectoral Sandpiper)
- *Charadrius leschenaultii* (Greater Sand Plover)
- *Gallinago hardwickii* (Latham's Snipe)
- *Limosa lapponica* (Bar-tailed Godwit)
- *Numenius madagascariensis* (Eastern Curlew)
- *Pandion haliaetus* (Osprey)
- *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 1154 Clarence Town Road, Seaham 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.

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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)							
Commelinaceae							
Commelina cyanea	Scurvy Weed						
Cyperaceae							
**Cyperus eragrostis*	Umbrella Sedge						
Juncaceae							
**Juncus cognatus*							
Poaceae							
Aristida vagans	Three-awn Speargrass						
**Cenchrus clandestinus syn Pennisetum clandestinum*	Kikuyu						
Cynodon dactylon	Common Couch						
Echinopogon ovatus	Hedgehog Grass						
**Ehrhartia erecta*	Panic Veldt Grass						
Entolasia stricta	Wiry Panic						
**Melinis repens*	Red Natal Grass						
Microlaena stipoides var. *stipoides*	Weeping Meadow Grass						
**Paspalum dilatatum*	Paspalum						
**Setaria parviflora* syn. *Setaria gracillis*	Slender Pigeon Grass						
**Sporobolus africanus*	Parramatta Grass						
Sporobolus creber	Slender Rats Tail						
Typhaceae							
Typha orientalis	Cumbungi						
MAGNOLIIDAE (Dicotyledons)							
Amaranthaceae							
**Gomphrena celosioides*	Gomphrena Weed						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Apocynaceae							
Marsdenia rostrata	Common Milk Vine				W		
					N W?		
Asteraceae							
**Bidens pilosa*	Cobblers Pegs						
**Cirsium vulgare*	Spear Thistle						Sept
**Conyza bonariensis*	Flax-leaved Fleabane						
**Hypochaeris radicata*	Catsear, Flatweed						
**Senecio madagascariensis*	Fireweed						Sept, Oct
**Sonchus oleraceus*	Common Sow Thistle						
**Tagetes minuta*	Stinking Roger						
**Taraxacum officinale*	Dandelion						
Campanulaceae							
Lobelia purpurascens	White Root						
Convolvulaceae							
Convolvulus erubescens	Australian Bindweed						
Dichondra repens	Kidney Weed						
Fabaceae Subfamily (Faboideae)							
Glycine tabacina sp. complex	Love Creeper						
**Trifolium repens*	White Clover						Sept, Oct
Fabaceae (Subfamily Mimosoideae)							
Acacia falcata	Falcata Wattle				W		
Acacia irrorata subsp. *irrorata*	Green Wattle						Nov, Dec
Acacia melanoxylon	Blackwood						
Gentianaceae							
**Cenaurium erythraea*	Common Centaury						
Lamiaceae							
**Stachys arvensis*	Stagger Weed						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Malvaceae							
**Malva parviflora*	Small-flowered Mallow						
**Sida rhombifolia*	Paddys Lucerne						
Myrtaceae							
Corymbia maculata	Spotted Gum						Mar, Apr
Eucalyptus crebra	Narrow-leaved Ironbark						Sept, Oct
Eucalyptus fibrosa subsp. *fibrosa*	Broad-leaved Ironbark						
Eucalyptus moluccana	Grey Box						Mar
Eucalyptus siderophloia	Grey Ironbark						
Eucalyptus tereticornis	Forest Red Gum						May, Aug, Sept, Oct
Melaleuca nodosa	Ball Honeymyrtle						Late Sept, Oct
Oleaceae							
**Olea europaea* subsp. *cuspidata*	African Olive						
Oxalidaceae							
**Oxalis sp.*							
Plantaginaceae							
**Plantago lanceolata*	Plantain						
Primulaceae							
**Lysimachia arvensis* syn. *Anagallis arvensis*	Scarlet Pimpernel						
Rosaceae							
**Rubus fruticosus* ssp. *aggregate*	Blackberry						
**Rubus parviflorus*							
Rubiaceae							
Pomax umbellata	Pomax						
**Richardia brasiliensis*	White Eye						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Solanaceae							
**Solanum linnaeanum*	Apple of Sodom						
**Solanum mauritianum*	Wild Tobacco						
Verbenaceae							
**Lantana camara*	Lantana						Noxious
**Verbena bonariensis*	Purple Top						
**Verbena rigida* var. *rigida*	Veined Verbena						

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 study area.

Tree No.	Species	Easting GDA94	Northing GDA94	DBH (m)	Ground dbh (m)	Distance from fence	Height (m)	Habitat				Comments	Removal Required?
								Class 1	Class 2	Class 3	Class 4		
1	*Eucalyptus tereticornis* Forest Red Gum	378231	6383922	0.58, 0.34			11					Many scratches	No
2	*Corymbia maculata* Spotted Gum	378227	6383923	0.36			14					Many scratches	No
3	*Melaleuca nodosa* Prickly-leaved Paperbark	378203	6383921	0.74, 0.61			12					Lots of pock marks. Stick nest in branches.	No
4	*E. tereticornis*	378200	6383922	0.74, 0.61			12						No
5	*E. tereticornis*	378196	6383938	0.42, 0.63			13				2	Many scratches, arboreal termite nest with hole, stick nest	No
6	*E. tereticornis*	378153	6383986	0.55			15					Scar on side of tree. Dead and dying *M. nodosa* at base.	**Yes**
7	*E. tereticornis*	378161	6384003	0.32			11						**Yes**
8	*E. tereticornis*	378161	6384005	0.24			10						**Yes**
9	*E. tereticornis*	378162	6384005	0.15			9						**Yes**
10	*E. tereticornis*	378161	6384007	0.12			6						**Yes**
11	*E. tereticornis*	378161	6384006	0.19			8						**Yes**
12	*E. tereticornis*	378162	6384003	0.20			9						**Yes**
13	*M. nodosa*	378158	6384004	0.17			5						**Yes**
14	*M. nodosa*	378158	6384006	0.23, 0.18			7						**Yes**
15	*M. nodosa*	378157	6384007	0.14			5						**Yes**
16	*M. nodosa*	378158	6384007	0.15			5						**Yes**
17	*M. nodosa*	378155	6384012	0.20, 0.18			7						**Yes**
18	*M. nodosa*	378159	6384008	0.30			8						**Yes**
19	*E. tereticornis*	378152	6384017	0.50			14						**Yes**
20	*E. tereticornis*	378145	6384009	0.35			13						**Yes**
21	*M. nodosa*	378145	6384010	0.29, 0.20			4						**Yes**
22	*E. tereticornis*	378139	6384013	0.54			13						**Yes**

Tree No.	Species	Easting GDA94	Northing GDA94	DBH (m)	Ground dbh (m)	Distance from fence	Height (m)	Habitat				Comments	Removal Required?
								Class 1	Class 2	Class 3	Class 4		
23	*E. tereticornis*	378136	6384002	0.71			18			1		Open at base and up trunk	**Yes**
24	*E. tereticornis*	378131	6384005	0.53			16						**Yes**
25	*E. tereticornis*	378129	6384004	0.37			18						**Yes**
26	*M. nodosa*	378104	6384013	0.17			4					Pock marks	**Yes**
27	*E. tereticornis*	378104	6384011	0.46			14						**Yes**
28	*E. tereticornis*	378095	6383960	0.67			18						**Yes**
29	*C. maculata*	378254	6383913	0.36			16						No
30	*C. maculata*	378255	6383914	0.38, 0.28			15						No
31	*C. maculata*	378327	6383908	0.32			15						No
32	*C. maculata*	378094	6384096	0.54	0.87	1.0	15			1		Scratches on bole	**Likely**
33	*C. maculata*	378100	6384134	0.21	0.30	1.5	11					Lots of scratches on bole	**Likely**
34	*C. maculata*	378105	6384157	0.51	0.80	1.1	13					Lots of scratches on bole	**Likely**
35	*Eucalyptus siderophloia* Grey Ironbark	378108	6384196	0.24	0.33	2.0	11						**Likely**
36	*Eucalyptus crebra* Narrow-leaved Ironbark	378108	6384194	0.45	0.60	2.5	16						**Likely**
37	*E. siderophloia*	378108	6384200	0.27	0.38	2.1	13						**Likely**
38	*E. siderophloia*	378112	6384206	0.24	0.34	1.5	13						**Likely**
39	*C. maculata*	378113	6384208	0.93	1.56	4.0	25		1	2			Structural Root Zone is 4m. Retain if possible
40	*E. siderophloia*	378111	6384214	0.39	0.47	2.1	16						**Likely**
41	*E. siderophloia*	378112	6384211	0.32	0.39	1.5	14						**Likely**
42	*E. siderophloia*	378113	6384221	0.40	0.49	1.9	15						**Likely**
43	*E. siderophloia*	378113	6384222	0.42	0.57	3.0	19						No
44	*E. tereticornis*	378086	6384041	0.55	0.71	0.0	13					Tree on fence	Retain
45	*C. maculata*	378427	6384017	0.12	8								**Yes**
46	*E. siderophloia*	378396	6384013	0.68	19								**Likely removal of limb**

Tree No.	Species	Easting GDA94	Northing GDA94	DBH (m)	Ground dbh (m)	Distance from fence	Height (m)	Habitat				Comments	Removal Required?
								Class 1	Class 2	Class 3	Class 4		
47	Dead Tree	378338	6383988	0.39	10				1		1	Crevises in bark	Retain
48	Dead Tree	378347	6383999	0.37	12						1		Retain
49	*C. maculata*	378358	6383996	0.56	17					1		Scar on trunk opens to Class 3 Scratches	Retain

APPENDIX C

CONSIDERATIONS UNDER SECTION 7.3 OF THE BC ACT 2016

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 following threatened species recorded within the study area during surveys are given below:

Endangered ecological communities recorded within the study area:

1. Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

Threatened fauna species recorded within the site:

2.	*Phascolarctus cinerus*	Koala
3.	*Miniopterus australis*	Little Bentwing-bat

1 Five Part Test of Significance for Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

The objective of section 7.3 of the Biodiversity Conservation Act 2016 (BC Act), the test of significance, is to provide standardised and transparent consideration of threatened species and ecological communities, and their habitats, through the development assessment process. The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species 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,*

Not applicable.

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,*

Approximately 0.36ha of vegetation consistent with the Endangered Ecological Community Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions was found to be present within the impact area.

This area of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions will require removal to accommodate the installation of the Battery Energy Storage System (BESS) and associated infrastructure.

A number of recommendations have been given to reduce the impact on Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions occurring within the study area. These recommendations are;

- Prior to clearing any vegetation the area to be removed and/or individual trees are to be clearly defined to prevent the unintended removal of any native vegetation. This can be achieved by the use of brightly coloured flagging line or bunting fence;
- The loss of native vegetation is to be compensated by the planting of locally native trees within more sparse areas of the site. Tree species will include *Eucalyptus tereticornis* (Forest Red Gum);
- Periodic weed control is to be conducted within areas of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions.

It is recommended that a vegetation management plan be completed for the site to help ensure the long-term viability of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions within the subject land.

The proposal will result in an incremental reduction of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions within the local area. However considering the current disturbance to this community within the site and taking into the consideration the recommendations the proposal is unlikely to significantly impact this endangered ecological community such that its local occurrence is likely to be placed at risk of extinction

c in relation to the habitat of a threatened species or ecological community:
- *iii. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
- *iv. 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*
- *v. 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,*

Approximately 0.36ha of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions will require removal to accommodate the installation of the Battery Energy Storage System (BESS) and associated infrastructure. The proposal will result in an incremental reduction of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions within the local area. However taking into the consideration the recommendations the proposal is unlikely to result in the removal, modification, fragmentation or isolation of an area of habitat important to the long term survival of this Endangered Ecological Community.

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 outstanding biodiversity value will be impacted by the proposal.

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 site have been listed in Table C.1.

Table C.1: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the subject site
Clearing of Native Vegetation.	The proposal will require the removal of 0.36ha of native vegetation. Considering the recommendations pertaining to this EEC the proposed action is unlikely to be significant.
Invasion of native plant communities by exotic perennial grasses.	Exotic grasses were common on the fringes of this EEC due to edge effects. There is the potential for further infestation, however, given the recommendation for a vegetation management plan for this area which will include regular

Key Threatening Process	Applicability in regards to the subject site
	weed control the impact from this threatening process would be reduced.
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	It is difficult to ascertain the disruption and structural changes, if any, past fires have caused the study area. The proposal is unlikely to result in a change in the frequency of fire in the local area.
Invasion, establishment and spread of Lantana (*Lantana camara*)	Lantana was recorded within the subject land. It is recommended that this weed be controlled as part of routine property maintenance.
Loss of Hollow-bearing Trees	Four hollow-bearing trees were recorded within the development footprint and all 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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014). This mitigation measure will ensure that no net loss of hollows will result from the proposed development.

2 Five Part Test of Significance for *Phascolarctus cinerus* (Koala)

The objective of section 7.3 of the Biodiversity Conservation Act 2016 (BC Act), the test of significance, is to provide standardised and transparent consideration of threatened species and ecological communities, and their habitats, through the development assessment process. The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species 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,

Pock marks on the boles of trees was recorded during fieldwork. It was difficult to determine if these were caused by Common Brushtail Possum, which was observed in large numbers within the subject land, or was evidence of one threatened species, *Phascolarctos cinereus* (Koala). No scats associated with this species was observed at the base of surveyed trees. Due to a number of local records within the last 5 years within 1km of the subject land and the presence of the Koala Food Tree species *Eucalyptus tereticornis,* the precautionary principle was taken and it was assumed *P. cinereus* was recorded within the study area. Suitable habitat was found to be present across the subject land within areas of open forest and woodland. One preferred feed tree species *Eucalyptus tereticornis* (Forest Red Gum) listed under the Port Stephens CKPoM was present within the subject land. As a result of the CKPoM assessment the canopy trees identified as PCT 3433 in the south of the study area was found to constitute Preferred Koala Habitat Fieldwork suggests that the study area may be utilised occasionally by a small number of Koalas as part of a much larger are of habitat, however there was no evidence of recent activity in the form of scats.

The proposal will result in the removal of approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land. Proposed underboring of the Preferred Koala habitat within the northern extent of the proposed cable installation will therefore not impact this habitat, with the underbore points located outside of the Preferred Koala Habitat.

No areas of habitat are likely to become significantly fragmented or isolated from other areas of habitat as a result of the proposed action. A number of recommendations including the retention of Preferred Koala Habitat wherever possible, planting of compensatory Koala Feed Trees and allowing the safe movement of Koalas through the site have been given to help reduce the impact of the development on the Koala (Section 8.0). Taking the recommendations into consideration it is less likely that the proposal will disrupt the life cycle of the Koala such that 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,

Not applicable.

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
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
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,

Approximately 0.13ha of Preferred Koala Habitat, 0.01ha of 50m buffer over marginal, 0.10ha of marginal, 0.99ha of 50m buffer over cleared land, 0.03ha of link over cleared, and 0.17ha of mainly cleared land will require removal to accommodate the installation of the Battery Energy Storage System (BESS) and associated infrastructure. The proposal will result in an incremental reduction of Koala Habitat within the local area. However taking into the consideration the recommendations the proposal is unlikely to result in the removal, modification, fragmentation or isolation of an area of habitat important to the long term survival of the Koala.

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 outstanding biodiversity value will be impacted by the proposal.

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 site have been listed in Table C.2.

Table C.2: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the subject site
Clearing of Native Vegetation.	The clearing of vegetation is listed as a major factor contributing to the loss of biological diversity. The removal of an area of open forest containing Koala Feed Tree species will lead to an incremental reduction of habitat for the Koala in the local area.
Predation by the European Red Fox Vulpes vulpes	The Red Fox was not recorded within the site but would be considered to have an impact on native fauna in the local area. The proposal is unlikely to result in an increase in the number of this introduced species.
Predation by the Feral Cat Felis catus	The Feral Cat was not recorded within the study area at the time of the survey however would be considered to have an impact on native fauna in the local area. The proposal is unlikely to result in an increase in the number of this introduced species.

Key Threatening Process	Applicability in regards to the subject site
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	It is difficult to ascertain the disruption and structural changes, if any, past fires have caused the study area. Fire has the potential to cause direct mortality to Koalas and impact the availability of foraging habitat.
Predation and hybridation of Feral Dogs Canis lupis famililaris	The Feral Dog was not recorded within the site during fieldwork. The Feral Dog may prey on Koalas within the local area. The proposal is unlikely to result in an increase in the number of this introduced species.

3 Five Part Test of Significance for *Miniopterus australis* (Little Bentwing Bat)

The objective of section 7.3 of the Biodiversity Conservation Act 2016 (BC Act), the test of significance, is to provide standardised and transparent consideration of threatened species and ecological communities, and their habitats, through the development assessment process. The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species 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,

Miniopterus australis was positively identified within the site during the microchiropteran bat call survey. The entire site is likely to contain suitable hunting habitat for this microchiropteran bat species. Preferred roosting habitat in the form of caves was absent within the site, however man-made structures in the form of two dwellings and associated infrastructure was located within the subject land. Roosting in the form of tree hollows was present within the study area. The removal of vegetation and up to 4 hollow-bearing trees from this site may result in an incremental loss in the quality of hunting and roosting habitat in the local area. . 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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014). This mitigation measure will ensure that no net loss of hollows will result from the proposed development.

Taking into consideration the relatively large amount of suitable hunting and roosting habitat retained within the subject land and within the local area, the absence of preferred roosting habitat within the site and the recommendation for compensatory nest boxes the proposal is unlikely to disrupt the life cycle of *M. australis* such that 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,*

Not applicable.

c in relation to the habitat of a threatened species or ecological community:
- *iii. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*
- *iv. 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*

v. 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,

Approximately 1.73ha hunting habitat for the Little Bentwing Bat and up to 4 hollow-bearing trees will require removal to accommodate the installation of the Battery Energy Storage System (BESS) and associated infrastructure. The proposal will result in an incremental reduction of habitat for the Little Bentwing Bat within the local area. However taking into the consideration the recommendations the proposal is unlikely to result in the removal, modification, fragmentation or isolation of an area of habitat important to the long term survival of the Little Bentwing Bat.

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 outstanding biodiversity value will be impacted by the proposal.

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 site have been listed in Table C.3.

Table C.3: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the subject site
Clearing of Native Vegetation.	The clearing of vegetation is listed as a major factor contributing to the loss of biological diversity. The removal of vegetation for the proposal will result in the removal of hunting habitat however for unlikely to result in a significant loss of habitat for this species.
Predation by the European Red Fox Vulpes vulpes	The Red Fox was recorded within the site and would be considered to have an impact on native fauna in the local area. The proposal is unlikely to result in an increase in the number of this introduced species.
Predation by the Feral Cat Felis catus	The Feral Cat was not recorded within the study area at the time of the survey however would be considered to have an impact on native fauna in the local area. The proposal is unlikely to result in an increase in the number of this introduced 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 difficult to ascertain the disruption and structural changes, if any, past fires have caused the study area. Fire has the potential to cause direct mortality to Koalas and impact the availability of foraging habitat.
Loss of Hollow-bearing Trees	Four hollow-bearing trees were recorded within the development footprint and all 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. Installation of nest boxes should be undertaken in accordance with Part B1 of Port Stephens Councils Development Control Plan (Port Stephens Council 2014). This mitigation measure will ensure that no

Key Threatening Process	Applicability in regards to the subject site
	net loss of hollows will result from the proposed development.