

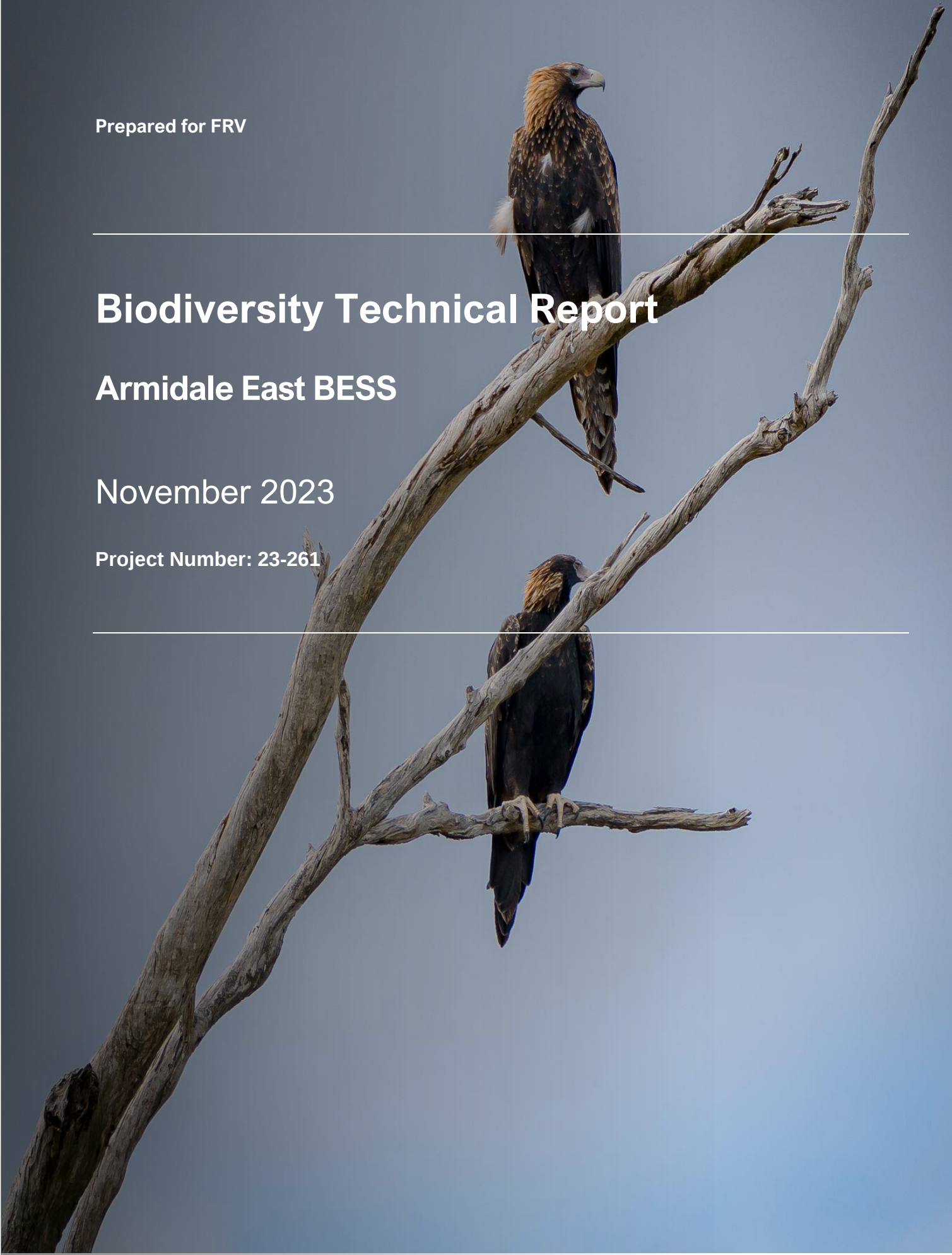
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Biodiversity Technical Report

Armidale East BESS

November 2023

Project Number: 23-261



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Acronyms and abbreviations

BAM	Biodiversity Assessment Methodology 2020 (NSW)
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
Biosecurity Act	<i>Biosecurity Act 2015</i> (NSW)
BOM	Australian Bureau of Meteorology
Cwth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cwth)
DECCW	(Former) Department of Environment, Climate Change and Water (NSW) (now DPIE)
DoEE	(Former) Department of the Environment and Energy (Cwth) (now DCCEEW)
DPE	Department of Planning and Environment (NSW)
DPIE	(Former) Department of Planning, Industry and Environment (NSW)
EEC	Endangered Ecological Community – as defined under relevant law applying to the proposal
EES	Environment, Energy and Science (NSW), Division of DPE
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
ha	hectares
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
KFH	Key Fish Habitat

km	kilometres
m	metres
NES	Matters of National Environmental Significance under the EPBC Act (<i>c.f.</i>)
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
OEH	(Former) Office of Environment and Heritage (NSW) (now EES)

1. Introduction

1.1. Project Summary

The Armidale East Battery Energy Storage System (BESS) (the Project) would involve the construction, operation and decommissioning of a BESS with a nominal capacity of up to 500 MW / 1000 MWh. The Project would supply electricity to the national electricity market during peak periods and will have an operational life of 40 years.

Currently a maximum Development Footprint for site access has been utilised for the purpose of assessment, though the final option will utilise a small corridor of this maximum considered footprint (refer Figure 1-1).

The proposed Development Footprint for the purpose of this Scoping Report is 22.18 ha of land which includes the BESS site and connection to the overhead transmission line (10 ha), and road corridor (12.18 ha).

1.2. Existing Environment

The Subject Land occurs at Pint Pot, approximately 16 km east of Armidale. The proposed 100MW BESS will be located within the New England Renewable Energy Zone and would extend across 10 hectares.

The Subject Land occurs within the New England Tablelands IBRA Bioregion and the Armidale Plateau IBRA sub-region. The NSW (Mitchell) Landscapes within the Subject Land includes the Dingo Spur Meta-sediments landscape.

The New England Tablelands Bioregion has an area of 3,004,202 ha extending from north of Tenterfield to south of Walcha and includes towns such as Armidale and Guyra, with Inverell just outside the boundary. The Armidale Plateau IBRA subregion is characterised by undulating hilly plateaus up to 1100 m above sea level. The geology within this subregion is typified by fine grained Permo-Carboniferous sedimentary rocks, granites and multiple Tertiary basalt flows.

The Subject Land is located on privately owned farmland adjacent to the existing constructed Metz Solar Farm. The land is predominately cleared and has been modified with pasture-improving grass species is being used for modified grazing of sheep and native pastures.

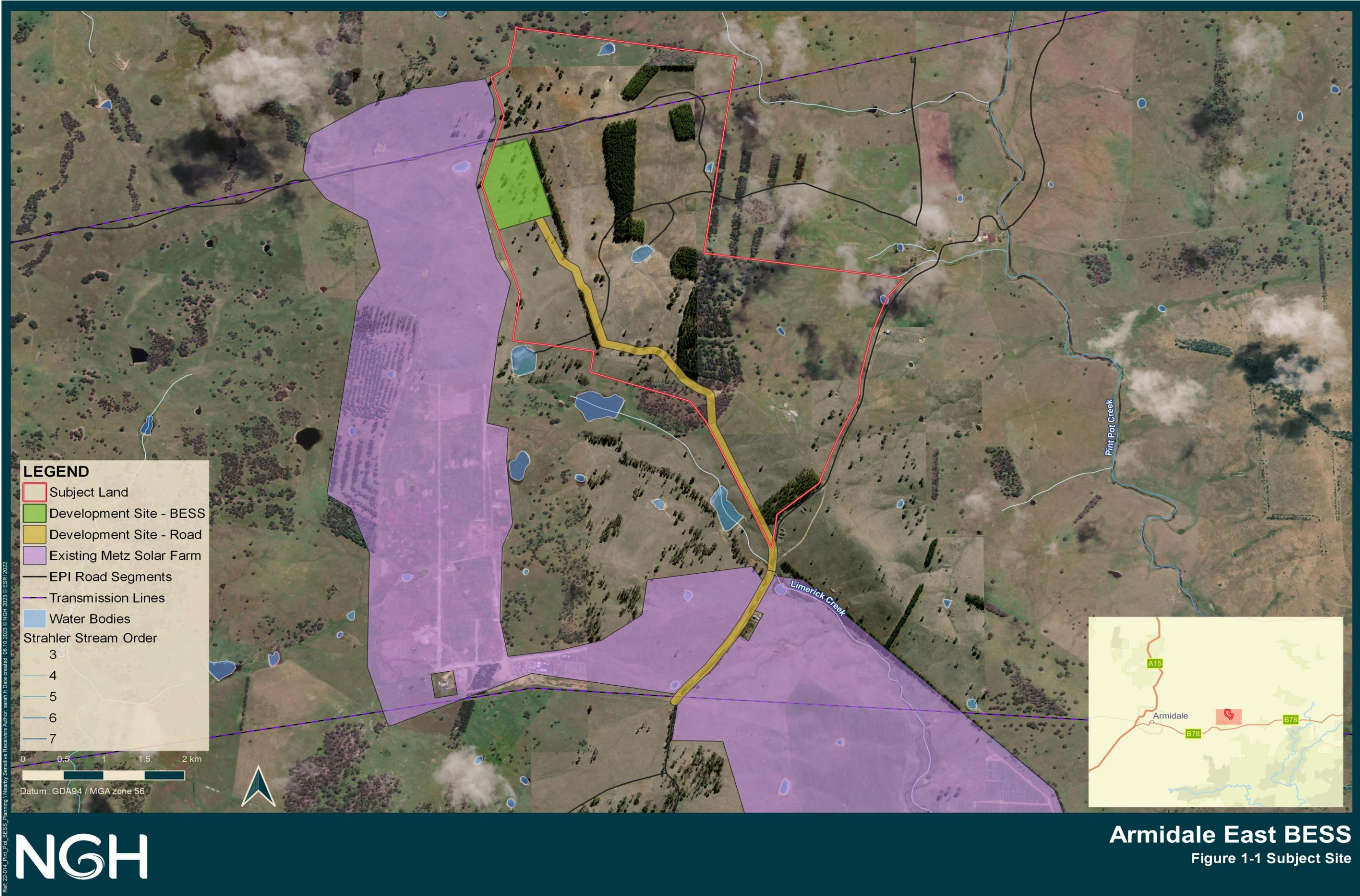


Figure 1-1 Site Location

2. Methods

2.1. Desktop assessment

Prior to the site visit, searches of the following database were conducted:

- The NSW BioNet Database for records of threatened species on the Subject Land within a 10km radius
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for nationally threatened species and ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- The Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, and
- Review of Areas of Outstanding Biodiversity Value declared under the Biodiversity Conservation Act 2016 (BC Act)
- Review of Biodiversity Values mapping

2.2. Field Assessment

A site visit was conducted to the proposed Battery Energy Storage System (BESS) at Pint Pot. This was undertaken by an Ecologist and a Senior Ecologist with BAM Accreditation over the span of four (4) survey days between 17th April 2023 and 20th April 2023. The visit included undertaking:

- Koala surveys as per the Spot Assessment Technique (SAT) (Phillips, 2011) across the entire Subject Land.
- Autumn flora surveys were conducted over the entire Subject Land. Targeted species included:
 - *Eucalyptus nicholii* (Narrow-leaved Black Peppermint)
 - *Eucalyptus magnificata* (Northern Blue Box)
 - *Dicanthium setosum* (Bluegrass)
 - *Haloragis exalata* subsp. *velutina* (Tall Velvet Sea-berry)
 - *Pterostylis metcalfei* (Metcalf's Greenhood)
 - *Thesium austral* (Austral Toadflax)

Flora surveys were conducted according to the flora survey assessment guidelines (Department of Planning, Industry and Environment, 2020) using parallel transects spaced 10m apart across the entire Subject Land which was comprised entirely of open vegetation composition.

- A single nocturnal survey was conducted by traversing the Subject Land after dusk and included spotlighting for arboreal fauna. Particular interest was taken in potential habitat features noted during diurnal surveys such as hollow-bearing trees and dens. Call playback was undertaken during this survey for threatened owl species, however no suitable breeding hollows for owls were found on site.
- Opportunistic observations, particularly of birds

3. Results

3.1. Native Vegetation

Four (4) Plant Community Types (PCTs) were predicted to occur within the Subject Land according to the NSW State Vegetation Type Mapping (SVTM). However, only two (2) were confirmed present during the site visit. A description and justification for each PCT classification has been provided below.

Table 3-1 Summary of PCT 3352

PCT 3352: Armidale Quartz Hills Stringybark Forest	
PCT Common Name	Armidale Quartz Stringybark Forest
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Evidence used to justify classification	The dominant canopy species in this PCT were limited to <i>Eucalyptus youmanii</i> along the southern slope with <i>Eucalyptus andrewsii</i> along the crest of the hill. Application of PCT 3352 for this area was justified due to the IBRA subregion Armidale Plateau and researching the lineage/history of past PCTs to confirm the most equivalent PCT under the new SVTM. Confidence was also gained

	from the vegetation formation being a Grassy Woodland and similar frequency and diversity of shrub and groundcover species seen within Vegetation Zone 4 where this PCT was seen in an intact habit with little disturbance.
Species relied upon for PCT Identification	Species Name • <i>Eucalyptus youmanii</i> • <i>Eucalyptus andrewsii</i> • <i>Hibbertia linearis</i> • <i>Poa sieberiana</i> • <i>Dichelachne micrantha</i>
Vegetation Zones	Two vegetation zones were identified within the Subject Land: • VZ4 – High: Includes intact grassy woodland with mature-to-young Eucalypt age cohorts and a high native species diversity (Figure 3-1) • VZ5 – Poor: Includes cleared agricultural land which has been subject to grazing and the sowing of pasture-improving graminoids for a long period of time. Native species that persist are primarily restricted to rushes (low palatability to livestock) and forbs.
TEC Association	No associated TECs
Estimate % PCT cleared	74.61%



Figure 3-1 PCT 3352/VZ 4 – High condition Grassy Woodland vegetation within Subject Land

Table 3-2 Summary of PCT 3359

PCT 3359: New England Hills Stringybark-Box Woodland	
PCT Common Name	New England Hills Stringybark-Box Woodland
Vegetation formation	Grassy Woodlands
Vegetation class	New England Grassy Woodlands
Evidence used to justify classification	Due to this PCT occurring within cleared paddocks and along road reserves with a moderate cover of weeds, this PCT was primarily identified confidently by the canopy species and landform. It should be noted that native groundcover species were either heavily grazed or outcompeted by weed species to be depended upon for PCT confirmation. Canopy species, though scattered in most areas, included key species such as <i>Eucalyptus moluccana</i>, <i>Eucalyptus melliodora</i>, <i>Eucalyptus caliginosa</i> and <i>Eucalyptus blakelyi</i>. The species were found persisting throughout areas where the landscape slowed from high rises to undulating hills leading to gully flats. <i>Eucalyptus bridgesiana</i> was also seen within neighbouring properties alongside dominant <i>Eucalyptus</i> species.
Species relied upon for PCT Identification	Species Name • <i>Eucalyptus moluccana</i> • <i>Eucalyptus blakelyi</i> • <i>Eucalyptus caliginosa</i> • <i>Eucalyptus melliodora</i> • <i>Eucalyptus caliginosa</i>
Vegetation Zones	Three vegetation zones were identified within the Subject Land: • VZ1 – Scattered Trees: Includes extant native vegetation surrounded by grazed agricultural land. • VZ2 – Poor: Includes cleared agricultural land which has been subject to grazing and the sowing of pasture-improving graminoids for a long period of time. Native species that persist are primarily restricted to rushes (low palatability to livestock) and forbs. • VZ3 – Moderate: Includes previously disturbed vegetation with some tree young, native canopy present, however, exotic vegetation is also present.
TEC Association	PCT 3359 is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Threatened Ecological Community (TEC). This TEC is listed as: • 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 Riverina Bioregions (NSW form listed under the BC Act), and • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Forest (Commonwealth form listed under the EPBC Act).
Estimate % PCT cleared	82.44%

3.2. Threatened Ecological Communities (TECs)

PCT 3359 has been found to be associated with one (1) TEC being the Box-Gum Woodland vegetation complex which includes the following TECs:

- 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 Riverina Bioregions (NSW form listed under the BC Act), and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Forest (Commonwealth form listed under the EPBC Act)

The following table uses data collected by NGH Ecologists during field survey to assess whether the vegetation within the Subject Land forms a part of either TEC the vegetation is associated with by using the relevant guidelines, determination listings and conservation advice documents published by respective government agencies.

Table 3-3 Box-gum woodland TEC justification for each Vegetation Zone.

Vegetation Zone	BC Act form - Final Determination (NSW Threatened Species Scientific Committee, 2020)	EPBC Act form - Listing Advice (DCCEEW, 2006)
VZ1	Yes. Meets description of floristic composition, structure, location, geology, soils, and disturbance history: - Located on the tablelands - Contains Yellow Box and Blakely's Red Gum - Ground layer mainly grassy	No. Does not satisfy the condition thresholds. Less than 12 native understorey species (excluding grasses) and the patch has less than 20 mature trees per hectare.
VZ2	Yes. The Vegetation Zone qualifies as the TEC under the BC Act due to PCT association with the listed TEC. VZ2 does not contain characteristic canopy species and has very sparse native forb/grass species. This vegetation zone may be associated with the TEC. A Vegetation Integrity score	No. Does not satisfy the condition thresholds. Patch has a predominantly native groundcover, however, has less than 12 native understorey species (excluding grasses) and has an average of less than 20 trees per hectare.
VZ3	Yes. Meets description of floristic composition, structure, location, geology, soils, and disturbance history. - Located on the tablelands - Contains Yellow Box and Blakely's Red Gum - Ground layer mainly grassy	No. Patch is not predominantly native and there are less than 12 native understorey species (excluding grasses).



Figure 3-2 PCT 3359 Scattered trees within the Subject Land



Figure 3-3 PCT 3359 Low condition Grassy Woodland vegetation within the Subject Land



Figure 3-4 PCT 3359 Moderate condition within the Subject Land

3.3. Exotic Vegetation Extent

Exotic vegetation was found in high densities along Bayley Park Road, these areas consisted of less than 5% native vegetation cover and therefore were deemed Exotic. Many exotic species were found within native vegetated areas, however, most species did not monopolise and rather co-existed with natives. A complete list of all exotic flora species found within the Subject Land can be found in **Appendix A**. One (1) exotic species being the Radiata Pine (*Pinus radiata*) was found within and adjacent to the Subject Land as either established individuals from dispersing seed or planted as forestry. Eight (8) High Threat Weeds/Exotics (under the BAM 2020) were found on site. :

- *Acetosella vulgaris* (Sheep Sorrel)
- *Axonopus fissifolius* (Narrow-leafed Carpet Grass)
- *Bidens pilosa* (Cobbler's Pegs)
- *Cenchrus clandestinus* (Kikuyu Grass)
- *Cyperus eragrostis* (Umbrella Sedge)
- *Eragrostis curvula* (African Lovegrass)
- *Paspalum dilatatum* (Paspalum)
- *Pinus radiata* (Radiata Pine)

3.4. Vegetation Connectivity

The Subject Land lies within a predominately cleared landscape used for agriculture and forestry. The proposal is unlikely to have a significant impact on habitat connectivity nor contribute to habitat fragmentation.

Regarding assessment of patch size, most vegetation zones within the Subject Land were located within 100m of >100 ha of native vegetation patches within the surrounding area as shown by existing mapping resources. The only exceptions were VZ 1 and VZ 4 which are isolated patches of scattered trees and forest respectively within a patch size of 5 – 25 hectares.

3.5. Biodiversity Values Mapping (BVM)

The Biodiversity Values Map (BVM), formed under the Biodiversity Offset Scheme (BOS), does not identify any high biodiversity value land within, nor surrounding area, to the Subject Land.

3.6. Threatened Species

Desktop searches of the Bionet Database (NSW Department of Planning and Environment, 2023) and EPBC Act Protected Matters Search Tool (PMST) (DCCEEW, 2023) identified the following as being identified or likely to occur within 10km of the Subject Land (the locality) see **Table 3-4**.

Table 3-4 Threatened entities with potential to be present on site:

Listing Type	NSW Bionet	PMST
Birds	<i>Anthochaera phrygia</i> (Regent Honeyeater) <i>Apus pacificus</i> (Fork-tailed Swift) <i>Artamus cyanopterus cyanopterus</i> (Dusky Woodswallow) <i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black-Cockatoo) <i>Chthonicola sagittata</i> (Speckled Warbler) <i>Climacteris picumnus victoriae</i> (Brown Treecreeper (Eastern Subspecies)) <i>Daphoenositta chrysoptera</i> (Varied Sittella) <i>Gallinago hardwickii</i> (Latham's Snipe) <i>Glossopsitta pusilla</i> (Little Lorikeet) <i>Hieraaetus morphnoides</i> (Little Eagle) <i>Hirundapus caudacutus</i> (White-throated Needletail) <i>Lophoictinia isura</i> (Square-tailed Kite) <i>Melanodryas cucullata cucullata</i> (Hooded Robin (south-eastern form)) <i>Ninox connivens</i> (Barking Owl) <i>Petroica boodang</i> (Scarlet Robin) <i>Petroica phoenicea</i> (Flame Robin) <i>Stagonopleura guttata</i> (Diamond Firetail)	<i>Anthochaera phrygia</i> (Regent Honeyeater) <i>Aphelocephala leucopsis</i> (Southern Whiteface) <i>Botaurus poiciloptilus</i> (Australasian Bittern) <i>Calidris ferruginea</i> (Curlew Sandpiper) <i>Calyptorhynchus lathami lathami</i> (South-eastern Glossy Black Cockatoo) <i>Climacteris picumnus victoriae</i> (Brown Treecreeper (south-eastern)) <i>Cyclopsitta diophthalma coxeni</i> (Coxen's Fig-Parrot) <i>Erythrorhynchus radiatus</i> (Red Goshawk) <i>Falco hypoleucos</i> (Grey Falcon) <i>Grantiella picta</i> (Painted Honeyeater) <i>Hirundapus caudacutus</i> (White-throated Needletail) <i>Lathamus discolor</i> (Swift Parrot) <i>Melanodryas cucullata cucullata</i> (Hooded Robin (south-eastern)) <i>Neophema chrysostoma</i> (Blue-winged Parrot) <i>Rostratula australis</i> (Australian Painted Snipe) <i>Stagonopleura guttata</i> (Diamond Firetail)

Listing Type	NSW Bionet	PMST
Mammals	<i>Dasyurus maculatus</i> (Spotted-tailed Quoll) <i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat) <i>Petrogale penicillate</i> (Brush-tailed Rock-wallaby) <i>Phascolarctos cinereus</i> (Koala) <i>Pteropus poliocephalus</i> (Grey-headed Flying Fox)	<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat) <i>Dasyurus maculatus maculatus</i> (Spotted-tail Quoll (southeastern mainland population)) <i>Notamacropus parma</i> (Parma Wallaby) <i>Petauroides Volans</i> (Greater Glider (southern and central)) <i>Petaurus australis australis</i> (Yellow-bellied Glider) <i>Petrogale penicillate</i> (Brush-tailed Rock-wallaby) <i>Phascolarctos cinereus</i> (Koala) <i>Potorous tridactylus tridactylus</i> (Long-nosed Potoroo (northern)) <i>Pseudomys novaehollandiae</i> (New Holland Mouse) <i>Pteropus poliocephalus</i> (Grey-headed Flying Fox)
Amphibians	None cited	<i>Litoria castanea</i> (Yellow-spotted Tree Frog) <i>Litoria piperata</i> (Peppered Tree Frog) <i>Litoria subglandulosa</i> (Glandular Frog) <i>Mixophyes balbus</i> (Stuttering Frog)
Reptiles	None cited	None cited
Fish	None cited	None cited
Flora	<i>Callistemon pungens</i> <i>Eucalyptus magnificata</i> (Northern Blue Box) <i>Eucalyptus nicholii</i> (Narrow-leaved Black Peppermint)	<i>Arthraxon hispidus</i> (Hairy-joint Grass) <i>Bertya sp. Clouds Creek</i> (M.Fatemi 4) <i>Callistemon pungens</i> <i>Cynanchum elegans</i> (White-flowered

Listing Type	NSW Bionet	PMST
	<i>Dichanthium setosum</i> (Bluegrass)	Wax Plant) <i>Dichanthium setosum</i> (Bluegrass) <i>Diuris eborensis</i> <i>Eucalyptus mckieana</i> (McKie's Stringybark) <i>Eucalyptus nicholii</i> (Narrow-leaved Black Peppermint) <i>Euphrasia arguta</i> <i>Hakea fraseri</i> (Gnarled Corkbark) <i>Haloragis exalata</i> subsp. <i>Velutina</i> (Tall Velvet Sea-berry) <i>Macadamia integrifolia</i> (Macadamia Nut) <i>Picris evae</i> (Hawkweed) <i>Thesium australe</i> (Austral Toadflax) <i>Vincetoxicum woollsii</i>
Migratory Species (Terrestrial)	N/A	<i>Actitis hypoleucos</i> (Common Sandpiper) <i>Apus pacificus</i> (Fork-tailed Swift) <i>Calidris acuminata</i> (Sharp-tailed Sandpiper) <i>Calidris ferruginea</i> (Curlew Sandpiper) <i>Calidris melanotos</i> (Pectoral Sandpiper) <i>Gallinago hardwickii</i> (Latham's Snipe) <i>Hirundapus caudacutus</i> (White-throated Needletail) <i>Monarcha melanopsis</i> (Black-faced Monarch) <i>Motacilla flava</i> (Yellow Wagtail) <i>Myiagra cyanoleuca</i> (Satin Flycatcher) <i>Rhipidura rufifrons</i> (Rufous Fantail) <i>Tringa nebularia</i> (Common Greenshank)

Four threatened species were detected within the Subject Land during the site visit:

- Dusky Woodswallow (*Artamus cyanopterus*) – Ecosystem Credit Species under the NSW BOS
- Scarlet Robin (*Petroica boodang*) – Ecosystem Credit Species under the NSW BOS
- Black Falcon (*Falco subniger*) – Ecosystem Credit Species under the NSW BOS
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) – Species Credit Species under the NSW BOS. Fifteen (15) mature *Eucalyptus nicholii* individuals were detected within the road reserve along Bayley Park Road. The species was positively identified as distinct from the similar *E. acaciiformis* due to the smooth branchlets on juvenile growth, the buds being between 2-3mm wide and flowers consisting of 7 buds. Additionally, the individuals were observed to be in flower, correlating with *E. nicholii*'s flowering season and occur along the undulating hills leading to a gully. Whereas *E. acaciiformis* is known to flower in December - January and is usually found adjacent to the margins of swamps or wet areas.

3.7. Habitat values

The site has the following habitat for threatened species:

- Six (6) koala use tree species, as stated within the Koala Survey Guide (Department of Planning and Environment, 2022), were identified within and around the Subject Land including:
 - Blakely's Red Gum (*Eucalyptus blakelyi*)
 - Yellow Box (*Eucalyptus melliodora*)
 - Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)
 - Grey Box (*Eucalyptus moluccana*)
 - Broad-leaved Stringybark (*Eucalyptus caliginosa*), and
 - Youman's Stringybark (*Eucalyptus youmanii*)
- A sparse number of hollow-bearing trees (live and stags) were found within VZ3 and VZ4 with solely small to medium size hollows being present within the woodland areas within Subject Land, providing breeding habitat for a range of native fauna species (potentially including state and federally listed threatened species listed in **Table 3-4**).
- Fallen timber, logs, solid and hollow providing habitat for invertebrates and other fauna.

3.8. Hydrology

The aquatic environment within the Subject Land is sparse. Seven (7) first order Strahler streams exist within the Subject Land; however, surface water flow would only be present in periods of heavy rainfall. A separate first order stream runs adjacent to the western side of the proposed BESS site.

Bayley Park Road does cross a third-order stream (Limerick Creek) that flows from the north-west to the south-east. During field surveys this area did contain seasonal pools of water and a minimal flow of water.

3.9. Key fish habitat (NSW Fisheries Management Act 1994)

Key Fish Habitat has been identified and mapped in the adjacent Limerick Creek. However, the existing Bayley Park Road already intersects this creek. It is recommended that any modifications to the creek line crossing, including the construction of the access road, allow for the continual passage of fish by continuing average flow of stream.

3.10. Groundwater Dependent Ecosystems

A search of the GDA Atlas (Bureau of Meteorology, 2020) shows that the Subject Land does not contain terrestrial areas that have been labelled as Groundwater Dependent Ecosystems (GDE). However, the proposed access road does include some land that is labelled Low Potential for GDE. There is also a Low-to-Moderate potential for terrestrial GDEs to occur adjacent to the Subject Land, however the impacts can be confined to the site boundary.

3.11. Matters of National Environmental Significance (EPBC) Act 1999

The EPBC Protected Matters Search Tool within 10km of the Subject Land did not find any Ramsar wetlands.

Three (3) TECs were listed as potentially occurring in the Subject Land:

- Lowland Rainforest of Subtropical Australia (Critically Endangered EPBC Act)
- New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands (Critically Endangered EPBC Act)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered EPBC Act)

3.12. Although PCT 3359 is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Threatened Ecological Community (TEC), no vegetation zones meet the criteria for the EPBC Act listed for the community (DECCW, 2010) (

PCT 3359 has been found to be associated with one (1) TEC being the Box-Gum Woodland vegetation complex which includes the following TECs:

- 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 Riverina Bioregions (NSW form listed under the BC Act), and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Forest (Commonwealth form listed under the EPBC Act)

The following table uses data collected by NGH Ecologists during field survey to assess whether the vegetation within the Subject Land forms a part of either TEC the vegetation is associated with by using the relevant guidelines, determination listings and conservation advice documents published by respective government agencies.

Table 3-3).

Forty-five threatened species were listed as potentially occurring in the Subject Land. These species have been listed in **Table 3-4**. The suitability of the habitat on site for each of the listed threatened species will be assessed within the Biodiversity Development Assessment Report (BDAR) at the submission of the EIS.

3.13. Serious and Irreversible Impacts (SII) Candidates under the Biodiversity Conservation Act 2017

Entities at risk of SII are assessed under the NSW BC Act using the BAM (NSW Department of Planning and the Environment, 2023). Assessment against the SII criteria will be required in the BDAR. SII impacts must be taken into consideration and the proposal must minimise or endeavour to eliminate impacts to SII entities.

3.13.1. Threatened Ecological Communities

One Threatened Ecological Community found on site is to be considered a SII candidate:

- PCT 3359 – New England Hills Stringybark-Box Woodland was confirmed to be on site during the site visit. This PCT is associated with the Critically Endangered White-Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community, listed in the BC Act and the EPBC Act.

The native vegetation patches that are to be considered on site are the remnant paddock trees within the BESS development footprint, and the vegetation along the Bayley Park Road corridor where road widening/tree trimming are likely to be undertaken. This SII candidate will be addressed in accordance with its respective SII principles within the BDAR.

3.13.2. Threatened Species

Seasonal surveys must be conducted for potential SII candidate species. Some SII species that will require surveying within the Subject Land due to surrounding records include;

- Three (3) threatened frog species have been listed to occur within the vegetation found along Limerick Creek and will require seasonal surveys
- One (1) species of orchid, *Pterostylis metcalfei*, which has been deemed potential within the area and associated with residing vegetation was surveyed during early April 2023 when flowering. This species was not recorded within, nor adjacent, to the Subject Land.

No other SII entities have been confirmed onsite, with further species to be considered as SII candidates being noted in the early stages of the Biodiversity Development Assessment Report (BDAR) (via BAM Calculator) so seasonal surveying can be planned.

It should be noted that impacts to SII can cause delays in assessment and approval if the impacts cannot be avoided or sufficiently minimised in the opinion of the regulator. Early discussion with regulators on entities at risk of SII are recommended once further field assessment identifies habitat for entities at risk of SII.

The SII Candidate Report, addressing the principles of determining if serious and irreversible impacts on each respective species, will be completed within the Biodiversity Development Assessment Report (BDAR) at the submission of the EIS.

4. Summary Constraints

The desktop and field assessment constraints analysis has resulted in the following constraints defined to the biodiversity values observed on site.

4.1. Key site constraints

The following constraints that were found during the preliminary biodiversity site visit have been assessed in Table 4.1 below.

Table 4 1. Key Values found within the Subject Land with assessed constraint level

Key Biodiversity Value	Constraint Level
Vegetation Vegetation Zones associated with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Threatened Ecological Community (BC Act) and will need to be assessed that, if impacted under this proposal, would be at risk of SAIL..	Moderate – The proposal will predominantly impact areas that are limited to scattered paddock trees and areas that have been pasture-improved for livestock grazing with little to native understorey species. The vegetation did not meet the minimum condition criteria to be considered under the associated EPBC TEC.
Aquatic Key Fish Habitat has been mapped within the adjacent Limerick Creek. Though the creek is predominantly shallow with mostly isolated pools, it is likely the creek accommodates high flow in times of heavy rainfall.	Low - It is recommended that any modifications to the creek line crossing on Bayley Park Road allows the continual passage of fish and no impacts to the average flow of stream.
Threatened Fauna Habitat Arboreal and Terrestrial Habitat Features such as hollow-bearing trees, stick nests, logs and dens	Low – A sparse number of hollow-bearing trees exist within, and adjacent to, the Subject Land. Logs and dens are mostly non-existent due to land use and woody vegetation being heavily fragmented within the landscape
Threatened Fauna Species Three (3) threatened fauna species (BC Act only) were detected within and/or adjacent to the Subject Land being; - Dusky Woodswallow (<i>Artamus cyanopterus</i>) - Scarlet Robin (<i>Petroica boodang</i>) - Black Falcon (<i>Falco subniger</i>)	Low – These species were not found to be nesting within the site and are listed as Ecosystem Credits under the Biodiversity Offset Scheme and do not require individual surveys.

Threatened Flora Species	Moderate - Fifteen (15) mature <i>Eucalyptus nicholii</i> individuals were detected within the road reserve along Bayley Park Road. Some may be impacted due to road widening. No other threatened flora species have been detected within the Subject Land at present.
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4.2. Avoid & Minimise Efforts

Initial efforts for avoidance and minimisation of impacts have been implemented where possible. The Subject Land predominantly lies within pasture-improved areas that have been grazed for decades. The moderate native cover within the “Poor” condition vegetation zones is due to the presence of *Juncus* sp. that have established due to the consistent disturbance and low palatability to livestock. The footprint area required for the BESS has been placed in an area that allows an easy connection to the immediately adjacent transmission line along with the Metz Solar Farm to the immediate west.

It has been established that avoiding all the *Eucalyptus nicholii* within the road corridor along Bayley Park Road would be difficult due to the narrow existing width of the road and the need to widen the road to allow the haulage of large infrastructure for this proposal. It has been recommended that this species be offset accordingly with the BOS as well as local plantings to retain local genetics.

4.3. Further Detailed Assessment

Further detailed ecological surveys, investigation and assessment will be undertaken in the format of a BDAR in further consultation with Biodiversity Conservation and Science Directorate (BCS) and in accordance with the Biodiversity Assessment Methodology (BAM, 2020). A credit obligation is anticipated to be generated, which may be retired through various options including payment into the Biodiversity Conservation Fund (BCF), establishment of a stewardship site to generate credits or purchase credits from the Biodiversity Credits Market.

Entities at risk of SAI are assessed under the NSW BC Act using the BAM. Assessment against the SAI criteria will be required within the BDAR. SAI impacts must be taken into consideration and the project must minimise or endeavour to eliminate impacts to SAI entities. Box Gum Woodland is listed as an SAI entity and is confirmed to be present onsite. Further SAI entities may be determined following further habitat evaluation or/and site surveys. It should be noted that impacts to SAI can cause delays in assessment and approval if the impacts cannot be avoided or sufficiently minimised in the opinion of the regulator. Early discussion with regulators on entities at risk of SAI are recommended once further field assessment identifies habitat for entities at risk of SAI.

4.3.1. Land Category Assessment (LCA)

A Land Category Assessment (LCA) is not recommended for the Subject Land due to the small total area within the Subject Land. The threatened species surveys will be conducted within the “Poor” vegetation zones alongside BAM floristic plots.

4.3.2. Applying the BAM 2020

Under the NSW Biodiversity Offsets Scheme (BOS) the proposal will be assessed using the Biodiversity Assessment Methodology (BAM) 2020 and will result in a credit obligation for the Armidale East BESS at the Subject Land where the vegetation integrity is greater than the VI threshold. The most effective method for reducing credit obligations will be through demonstrating avoidance of better-quality native vegetation, such as the woody vegetation, and is a requirement which must be addressed in any Biodiversity Development Assessment Report (BDAR).

Credit obligations under the BOS will be generated if biodiversity values cannot be avoided. Biodiversity credits generated through removal of native vegetation and impacts on threatened species, must be retired through various options under the BOS, including paying credits into the Biodiversity Conservation Fund (BCF), purchase and retirement of credits from the credit market or establishment of Biodiversity stewardship sites (or a combination of these options). It is recommended to assess the entire Subject Land as a whole and to conduct surveys across the entire area to demonstrate avoidance of biodiversity values.

The Armidale East BESS proposal is likely to impact a small portion of native vegetation in the form of native trees and fragmented woodland.

4.3.3. Environment Protection & Biodiversity Conservation (EPBC) Act 1999 Referral

All relevant EPBC listed entities that are likely to be present would be included in targeted surveys with impacts reported upon and offset (where applicable) in the BDAR.

Currently, one (1) EPBC-listed entity has been detected within the Subject Site, being fifteen (15) individuals of the Narrow-leaved Peppermint (*Eucalyptus nicholii*) listed as Vulnerable under the EPBC Act. Currently, it is not known how many *E. nicholii* individuals would be directly impacted as result of widening of Bayley Park Road. If impacted, this species will be offset accordingly under the NSW BOS system and will also be recommended to be planted within the surrounding area to ensure local population/genetic pool remains.

The requirement for an EPBC Referral will be assessed following quantification of the impacts to *E. nicholii* in relation to confirmed road design.



Figure 4-1 Plant Community Types (PCTs) within Subject Land



Figure 4-2 Plant Community Types (PCTs) within Subject Land



Figure 4-3 Plant Community Types (PCTs) within Subject Land

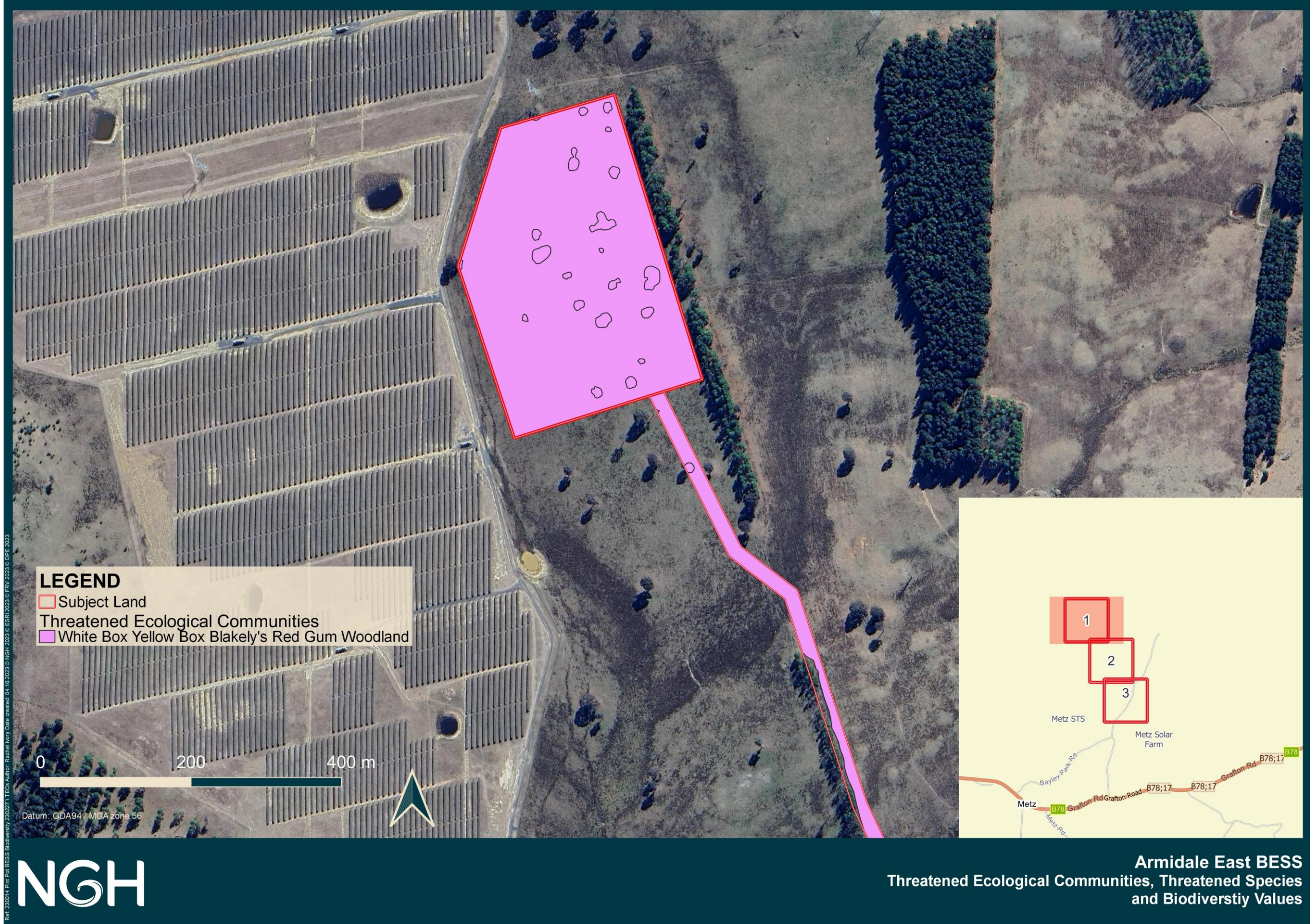


Figure 4-4 Threatened Ecological Communities (TECs), Threatened Species and Biodiversity Values within Subject Land



Figure 4-5 Threatened Ecological Communities (TECs), Threatened Species and Biodiversity Values within Subject Land



Figure 4-6 Threatened Ecological Communities (TECs), Threatened Species and Biodiversity Values within Subject Land

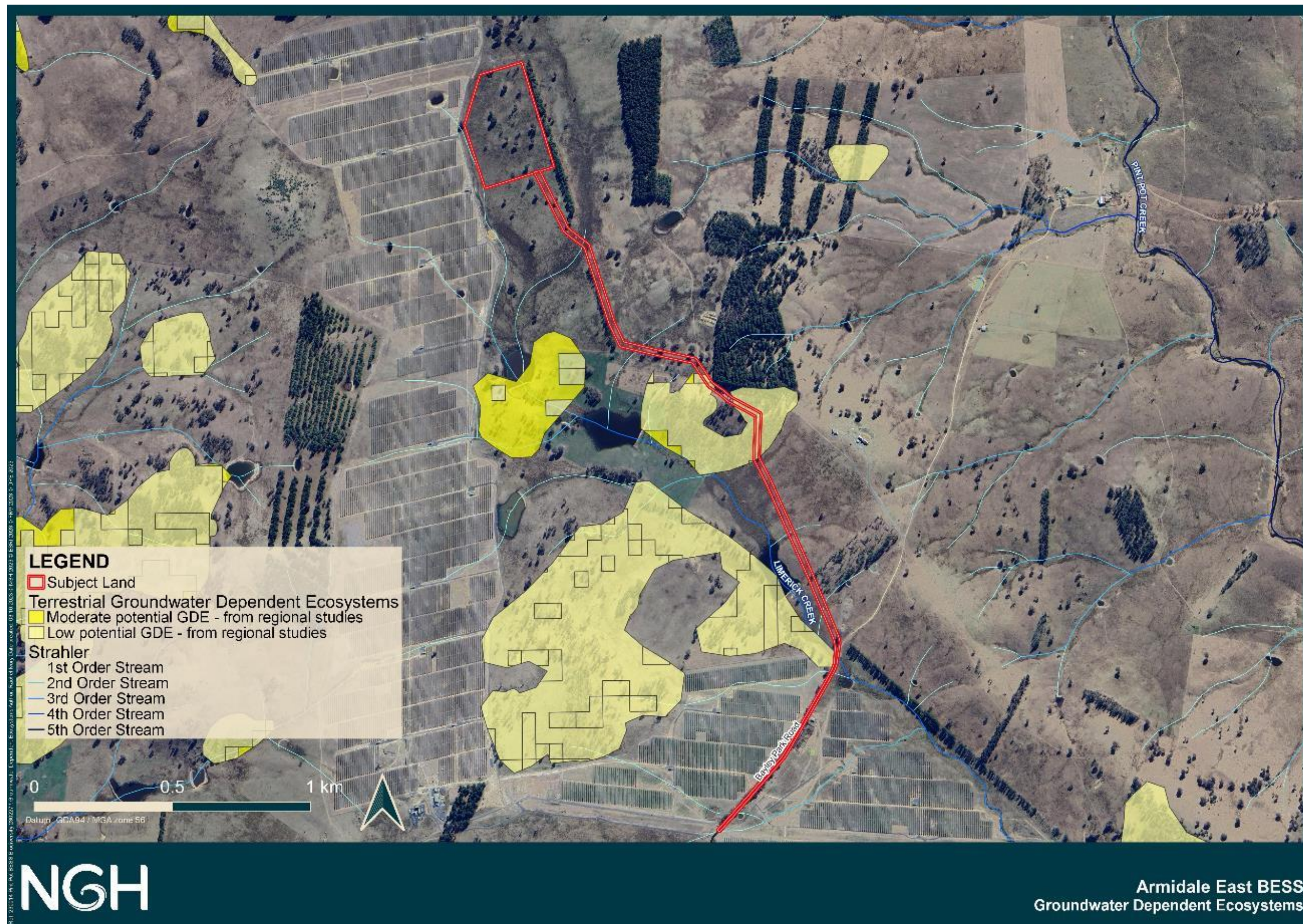


Figure 4-7 Groundwater Dependent Ecosystems

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Appendix A Flora List

Family	Scientific Name	Common name	Exotic
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	*
Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-Daisy	
Asteraceae	<i>Cassinia quinquefaria</i>	No common name	
Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting	
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	*
Asteraceae	<i>Conyza spp.</i>	A Fleabane	*
Asteraceae	<i>Cotula australis</i>	Common Cotula	
Asteraceae	<i>Euchiton sphaericus</i>	Star Cudweed	
Asteraceae	<i>Gamochaeta coarctata</i>	No common name	*
Asteraceae	<i>Hypochaeris glabra</i>	Smooth Catsear	*
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	*
Asteraceae	<i>Picris angustifolia</i>	No common name	
Asteraceae	<i>Soliva sessilis</i>	Bindyi	*
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	*
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*
Brassicaceae	<i>Lepidium africanum</i>	Common Peppergrass	*
Campanulaceae	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	
Caryophyllaceae	<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort, Brazilian Whitlow	*
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	
Clusiaceae	<i>Hypericum gramineum</i>	Small St John's Wort	
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge	*
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge	
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge	
Dilleniaceae	<i>Hibbertia linearis</i>	No common name	
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine	
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	False Sarsaparilla	
Fabaceae (Faboideae)	<i>Pultenaea microphylla</i>	A Bush Pea	
Fabaceae (Faboideae)	<i>Trifolium repens</i>	White Clover	*

Family	Scientific Name	Common name	Exotic
Fabaceae (Mimosoideae)	<i>Acacia buxifolia</i>	Box-leaved Wattle	
Fabaceae (Mimosoideae)	<i>Acacia decurrens</i>	Black Wattle	
Fabaceae (Mimosoideae)	<i>Acacia ulicifolia</i>	Prickly Moses	
Fabaceae (Mimosoideae)	<i>Acacia venulosa</i>	No common name	
Geraniaceae	<i>Geranium solanderi</i>	Native Geranium	
Goodeniaceae	<i>Goodenia hederacea</i>	Ivy Goodenia	
Haloragaceae	<i>Gonocarpus tetragynus</i>	Poverty Raspwort	
Haloragaceae	<i>Haloragis heterophylla</i>	Variable Raspwort	
Juncaceae	<i>Juncus usitatus</i>	No common name	
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Matt-rush	
Loranthaceae	<i>Amyema spp.</i>	Mistletoe	
Myrtaceae	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	
Myrtaceae	<i>Eucalyptus caliginosa</i>	Broad-leaved Stringybark	
Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box	
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	
Myrtaceae	<i>Eucalyptus pauciflora</i>	White Sally	
Myrtaceae	<i>Eucalyptus youmanii</i>	Youman's Stringybark	
Oleaceae	<i>Notelaea venosa</i>	Veined Mock-olive	
Oxalidaceae	<i>Oxalis corniculata</i>	Creeping Oxalis	*
Phormiaceae	<i>Dianella revoluta</i>	Blueberry Lily	
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera	
Phytolaccaceae	<i>Phytolacca octandra</i>	Inkweed	*
Pinaceae	<i>Pinus radiata</i>	Radiata Pine	*
Pittosporaceae	<i>Bursaria spinosa</i>	Native Blackthorn	
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	*
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass	
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass	*
Poaceae	<i>Briza maxima</i>	Quaking Grass	*
Poaceae	<i>Bromus catharticus</i>	Prairie Grass	*
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass	*
Poaceae	<i>Chloris truncata</i>	Windmill Grass	
Poaceae	<i>Cynodon dactylon</i>	Common Couch	
Poaceae	<i>Dactylis glomerata</i>	Cocksfoot	*

Family	Scientific Name	Common name	Exotic
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	
Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	
Poaceae	<i>Eleusine tristachya</i>	Goose Grass	*
Poaceae	<i>Elymus scaber</i>	Common Wheatgrass	
Poaceae	<i>Eragrostis curvula</i>	African Lovegrass	*
Poaceae	<i>Festuca nigrescens</i>	Chewings Fescue	*
Poaceae	<i>Lachnagrostis filiformis</i>	No common name	
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	*
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass	
Poaceae	<i>Panicum effusum</i>	Hairy Panic	
Poaceae	<i>Paspalidium distans</i>	No common name	
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	*
Poaceae	<i>Poa annua</i>	Winter Grass	*
Poaceae	<i>Poa sieberiana</i>	Snowgrass	
Poaceae	<i>Rytidosperma spp.</i>	No common name	
Poaceae	<i>Setaria parviflora</i>	No common name	*
Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	
Poaceae	<i>Vulpia bromoides</i>	Squirrel Tail Fesque	*
Polygonaceae	<i>Acetosella vulgaris</i>	Sheep Sorrel	*
Polygonaceae	<i>Polygonum aviculare</i>	Wireweed	*
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock	
Portulacaceae	<i>Portulaca oleracea</i>	Pigweed	
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	*
Thymelaeaceae	<i>Pimelea neo-anglica</i>	Poison Pimelea	
Violaceae	<i>Viola spp.</i>	No common name	*

Appendix B Fauna List

Family	Scientific Name	Common name	Exotic
Aves	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	
Aves	<i>Anas superciliosa</i>	Pacific Duck	
Aves	<i>Aquila audax</i>	Wedge-tailed Eagle	
Aves	<i>Artamus cyanopterus</i>	Dusky Woodswallow	
Aves	<i>Aythya australis</i>	Hardhead	
Aves	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo Shrike	
Aves	<i>Corcorax melanorhamphos</i>	White winged Chough	
Aves	<i>Falco berigora</i>	Brown Falcon	
Aves	<i>Falco subniger</i>	Black Falcon	
Aves	<i>Gymnorhina tibicen</i>	Australian Magpie	
Aves	<i>Haliastur sphenurus</i>	Whistling Kite	
Aves	<i>Manorina melanocephala</i>	Noisy miner	
Aves	<i>Petroica boodang</i>	Scarlet Robin	
Aves	<i>Platycercus elegans</i>	Crimson rosella	
Aves	<i>Platycercus eximius</i>	Eastern rosella	
Aves	<i>Poliiocephalus poliocephalus</i>	Hoary Headed Grebe	
Aves	<i>Psephotus haematonotus</i>	Red Rumped Parrot	
Aves	<i>Rhipidura leucophrys</i>	Willie wagtail	
Aves	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	
Mammalia	<i>Trichosurus vulpecula</i>	Brush-tailed possum	
Mammalia	<i>Macropus rufogriseus</i>	Red-necked Wallaby	
Mammalia	<i>Vulpes vulpes</i>	European Fox	*

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