

Modification 1: Submissions Report

Broken Hill Battery Energy Storage System

06-Jun-2022

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Broken Hill Battery Energy Storage System

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06-Jun-2022

Job No.: 60619153

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Quality Information

Document Modification 1: Submissions Report

Ref 60619153

Date 06-Jun-2022

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Reviewed by William Miles

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	10-May-2022	For client review	Liam Buxton Project Manager	
0	06-Jun-2022	Final	Liam Buxton Project Manager	

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Executive Summary

AGL Energy Limited (AGL), being the original proponent, received development consent (SSD-11437498) on 8 September 2021 from the NSW Minister for Planning and Public Spaces for the construction and operation of a Battery Energy Storage System (BESS) for a nominal capacity of approximately 50 MW and up to 100 MWh (the approved Project) at 74 to 80 Pinnacles Place, Broken Hill, 2880 (referred to as 'the Site'). The key features for the approved Project included:

- Construction and operation of a BESS of a nominal capacity of approximately 50 MW and up to 100 MWh at 74 to 80 Pinnacles Place, Broken Hill, 2880 (on Lots 57 and 58 of DP 258288).
- Connection of the BESS to the nearby Transgrid Broken Hill substation via a 22 kV overhead powerline connecting through a 22 kV busbar at the substation (Lot 2 DP1102040), (referred to as 'the substation site').

The 22 kV transmission connection would traverse Lot 7302 DP 1181129, which is located between the Site and the substation site.

The approved Project was State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). An Environmental Impact Statement (EIS) (AECOM, 2021) was prepared in accordance with the relevant provisions of the EP&A Act. The EIS was prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning, Industry and Environment (DPIE) (now Department of Planning and Environment (DPE)) on 23 December 2020 and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation).

AGL is seeking to modify SSD-11437498 in accordance with section 4.55(2) of the EP&A Act, to allow for the option of installing the transmission connection belowground in part or in full along a revised alignment between the Site and Transgrid substation (referred here within as the 'modification area'). Similar to the approved transmission corridor, the modified transmission connection would require a corridor across Lot 7302 DP1181129 and part of the substation site.

The Modification Report was placed on public exhibition for a period of 28 days, between 8 March 2022 and 5 April 2022. During the exhibition period, the general public, organisations, and government agencies were invited to make submissions. One submission was received from the public in support of the proposed modification, with eight submissions received from government agencies.

This Submissions Report addresses the requirements to consider and respond to all submissions received and has been prepared having regard to the NSW Government's "*State significant development guidelines – preparing a submissions report: Appendix C to the state significant development guidelines*" (DPE, 2021) (the guideline).

This Submissions Report further demonstrates that the Proposed Modification is appropriately located (as confirmed by Broken Hill City Council) and can be undertaken in a manner that would not result in significant impacts on the local community or the environment. The benefits of the Proposed Modification are considered to outweigh the limited environmental and social impacts, and as such the Proposed Modification is considered justified and worthy of development consent.

1.0 Introduction

1.1 Background

AGL Energy Limited (AGL) received development consent (SSD-11437498) on 8 September 2021 from the NSW Minister for Planning and Public Spaces for the construction and operation of a Battery Energy Storage System (BESS) for a nominal capacity of approximately 50 MW and up to 100 MWh (the approved Project) at 74 to 80 Pinnacles Place, Broken Hill, 2880 (referred to as 'the Site'). The key features for the approved Project included:

- Construction and operation of a BESS of a nominal capacity of approximately 50 MW and up to 100 MWh at 74 to 80 Pinnacles Place, Broken Hill, 2880 (Lots 57 and 58 of DP 258288).
- Connection of the BESS to the nearby Transgrid substation via a 22 kV overhead powerline connecting through a 22 kV busbar at the substation (Lot 2 DP1102040), (referred to as 'the substation site').

The 22 kV transmission connection would traverse Lot 7302 DP 1181129, which is located between the Site and the substation site (discussed further in **Section 4.1.1**). A map of the modification area in its regional setting has been provided as **Figure 1-1**.

The approved Project was State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). An Environmental Impact Statement (EIS) (AECOM, 2021) was prepared in accordance with the relevant provisions of the EP&A Act.

Following approval of the SSD-11437498, Transgrid requested AGL modify the connection location at their substation. Transgrid's request means the transmission connection now needs to connect to a location further to the north-west on the substation site. As a result, the proposed overhead BESS transmission connection will now have to cross the alignment of existing transmission lines that extend from the substation. In order to cross these existing transmission alignments, the transmission connection may need to be installed belowground in part or in full. The potential installation of the transmission connection belowground was not assessed as part of the Project and, as such, will require a modification to SSD-11437498.

Therefore, AGL is seeking to modify SSD-11437498 in accordance with section 4.55(2) of the EP&A Act, to allow for the option of installing the transmission connection belowground along a revised alignment between the Site and Transgrid substation. Similar to the approved transmission corridor, the modified transmission connection would require a corridor (approximately 20 metres wide) across Lot 7302 DP1181129 and part of the substation site. The details of the Proposed Modification are captured in the Broken Hill Battery Energy Storage System Project, Modification Report – prepared by AECOM Australia Pty Ltd (AECOM), dated February 2022 (Modification Report).

AGL has sought to establish and maintain authentic relationships with the community and stakeholders through consultation and effective communications from an early stage and throughout the development of the Project. This is to ensure the community are meaningfully included during the feasibility, planning and development phases of the Project. AGL will continue to inform the local community and stakeholders at key milestones as the Project progresses through the planning of the modifications, with the aim to demonstrate commitment to transparency and accountability.

A community and stakeholder engagement plan (CSEP) was developed by AGL for the Proposed Modification. AGL's consultation objectives for the Proposed Modification are discussed further in **Section 4.2.1**.

1.2 Project objectives

The works required to modify the location and construction approach for the transmission connection would not change the objective or purpose of the approved Project as presented in the EIS. The objectives of the Proposed Modification are as follows:

- Provide firming capability to existing renewable projects in the Broken Hill region and throughout the National Energy Market (NEM)

- Provide islanding functionality and support a reliable electricity to Broken Hill in the event of a separation from the grid
- Capture and use curtailed energy from renewable projects connected to the Transgrid Broken Hill substation
- Provide dynamic voltage control services to help correct and/or stabilise the wider transmission network
- Provide a new source of energy supply to support greater penetration of intermittent renewable energy.

1.3 Proponent details

AGL operates base load, peaking and intermediate electricity generation plants supplying energy using traditional thermal generation as well as renewable sources. AGL employs over 8,300 people across Australia, over 4,000 of which are within NSW. AGL supplies energy and other services to almost 4.2 million customer accounts and is committed to making energy, alongside other essential services, simple, fair and transparent.

AGL operates the largest electricity portfolio in the NEM, made up of traditional coal- and gas-fired generation, and renewables such as wind, hydro and solar. AGL also operate gas storage and production assets.

In 2021 AGL announced it was undertaking significant restructuring of its business operations. In response to this restructuring, and part of the Proposed Modification, AGL seek to amend the proponent details from AGL to AGL Macquarie (AGLM). A summary of this amendment is detailed in **Table 1-1**.

Table 1-1 Proponent details

	Original Proponent	Proposed Proponent
Name	AGL Energy Limited	AGL Macquarie Pty Ltd
ABN	74 115 061 375	18 167 859 494
Contact	Natalie Leighton	Richard Page
Position	Deputy Project Manager	Project Director

1.4 Purpose of this report

This Submissions Report has been prepared in broad accordance with the NSW Government's "*State significant development guidelines – preparing a submissions report: Appendix C to the state significant development guidelines*" (DPE, 2021) (the guideline). This guideline provides a detailed explanation of the form and content requirements for submission reports. Pursuant to the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation), a submissions report submitted to Department of Planning and Environment (DPE) in support of an SSD modification application must be prepared having regard to the SSD guidelines prepared by the Planning Secretary.

A summary of compliance against the criteria of Appendix A of the State significant development guidelines has been provided in **Table 1-2**.

Table 1-2 Modification Report Requirements (DPIE, 2021)

Requirement	Reference
Executive summary	Included at the preface of this Submissions Report
Introduction	Section 1.0
Analysis of submissions	Section 2.0
Actions taken since exhibition	Section 4.0

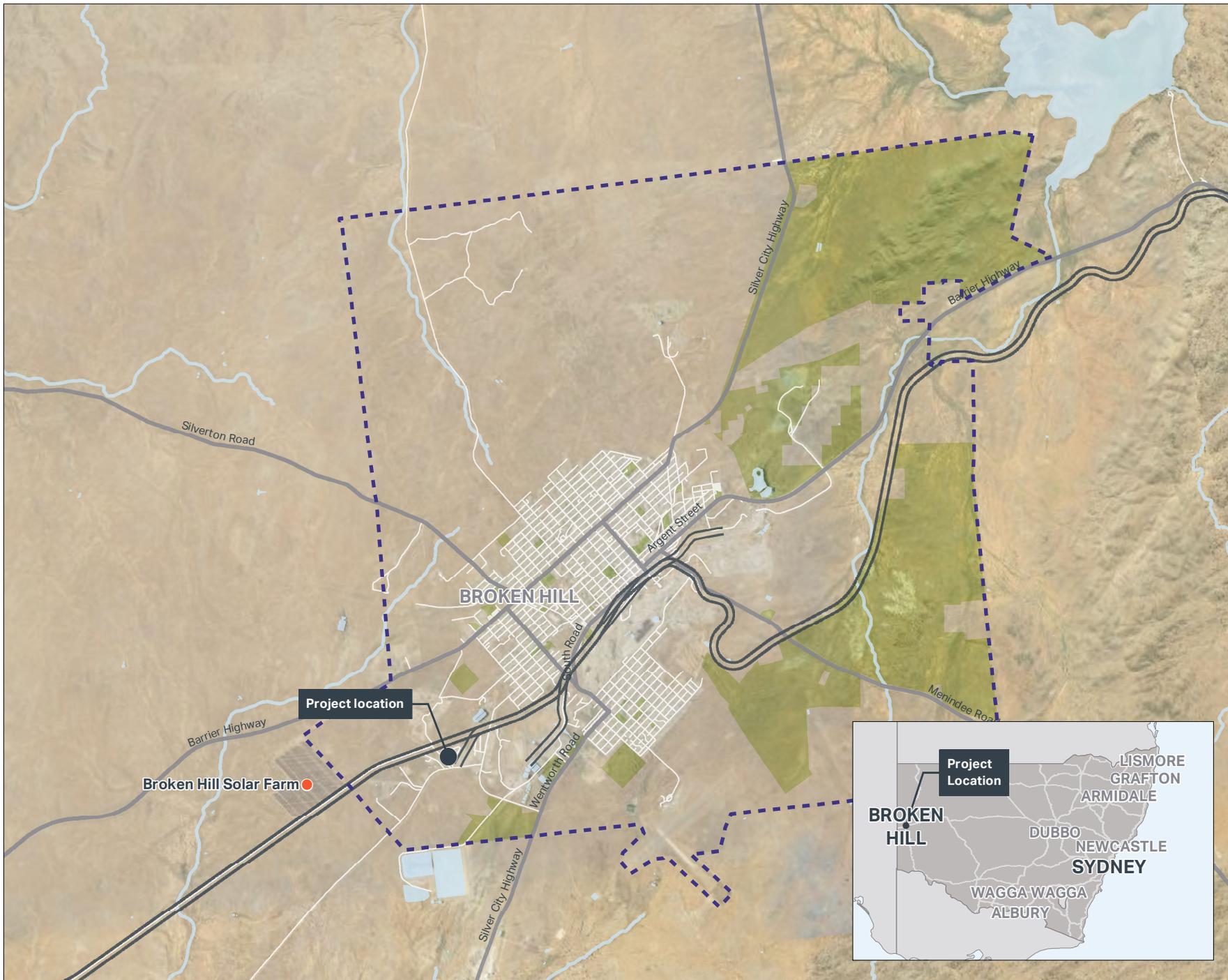
Requirement	Reference
Response to submissions	Section 3.0
References	Section 6.0
Submissions Register	Section 3.0
Update mitigation measures	Appendix A Mitigation measures
Supporting information, including any detailed engagement or technical reports	Appendix B – Biodiversity Development Assessment Report

In line with the guideline, **Section 5.0** provides a conclusion to this Submissions Report and provides an updated project justification and evaluation.



Legend

- Project location
- Broken Hill City Council
- Main road
- Local road
- Railway
- Watercourse
- Park, forest, reserve
- Existing renewable energy generating project



**FIGURE 1-1:
REGIONAL CONTEXT**

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2.0 Analysis of submissions

An overview of the submissions made during the Modification Report exhibition period is provided in **Table 2-1**. Copies of the full submissions can be viewed or downloaded from the [NSW Major Projects website](#)¹.

The following organisations provided submissions:

- Broken Hill City Council
- DPE – Hazards
- DPE – Water
- DPE - Crown Lands
- Department of Premier and Cabinet (DPC) – Heritage NSW
- Department of Regional NSW – Mining, Exploration and Geoscience
- Transgrid
- Biodiversity Conservation Division

One Submission outlining support of the Proposed Modification was also provided by a community member.

Table 2-1 Overview of submissions received

Position	Number of submissions from government agencies and other organisations	Number of submissions from community members	Total
Support	-	1	1
Comment	8	-	8
Objection	-	-	-
Total			9

¹ <https://pp.planningportal.nsw.gov.au/major-projects/projects/mod-1-transmission-line-connection-and-design>

3.0 Response to submissions

This section provides verbatim text from the original submission as well as a response to those submissions. Responses in this section are restricted to agencies and organisations as the community submission was a comment only, supporting the Proposed Modification. A summary of the submissions received throughout the exhibition period and where they have been addressed is provided in **Table 3-1**.

Table 3-1 Submissions register

Group	Name	Section where issues addressed in this Submissions Report
Public authorities	DPE – Hazards	Section 3.2
	DPE – Water	Section 3.3
	DPE – Crown Lands	Section 3.4
	DPC – Heritage NSW	Section 3.5
	Department of Regional NSW – Mining, Exploration and Geoscience	Section 3.6
	Transgrid	Section 3.7
	Biodiversity Conservation Division	Section 3.8
Council	Broken Hill City Council	Section 3.1
Stakeholder groups	No submission was received from any stakeholder groups.	Not applicable
Individuals		Section 3.9

3.1 Broken Hill City Council

Submission	Response
<p>The Broken Hill City Council have reviewed the Modification Report (AECOM, 2022) Comments on the Modification Proposal remain the same as the original proposal being that Broken Hill City Council:</p> <ul style="list-style-type: none"> • Have no objection or concerns • Have liaised with AGL throughout the planning process 	<p>The comments made by Broken Hill City Council are noted.</p>

3.2 Department of Planning and Environment – Hazards

Submission	Response
<p>After review of the Modification Report (AECOM, 2022), DPE Hazards has stated that the Modifications outlined are not related to Chapter 3 of the State Environmental Planning Policy (Resilience and Hazards) 2021 and would not significantly change the risks associated with the BESS battery enclosures.</p>	<p>The comments made by DPE Hazards are noted.</p>

3.3 Department of Planning and Environment – Water

Submission	Response
<p>The following recommendations have been submitted by DPE Water after review of the Modification Report (AECOM, 2022) to ensure minimisation of risk and prevention of degradation of waterfront land:</p> <ul style="list-style-type: none"> • Ensure appropriate trench depth combined with suitable stabilisation, rehabilitation and monitoring is implemented to minimise erosion of waterfront land and risk to transmission line infrastructure. • Prepare a Soil and Water Management Plan to address stormwater management and sediment and erosion control. The plan is to address the requirements of the guideline <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) and the <i>Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land</i> (NRAR 2018). 	<p>The comments by DPE Water have been noted. In the Modification Report (AECOM, 2022) it was proposed that a Soil and Water Management Plan (SWMP) be prepared in order to document and assist with the implementation of the measures required to manage potential erosion impacts related to the Proposed Modification. The SWMP would address the requirements of the guideline <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) and the <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR 2018). The mitigation measures to address these comments are provided in Appendix A..</p>

3.4 Department of Planning and Environment – Crown Lands

Submission	Response
<p>Since reviewing the Modification Report (AECOM, 2022), Crown Lands have stated that all comments have been addressed in previous requests for advice for the approved Project. Crown lands have no further comments for the proposal. It was noted that any further enquiries relating to the Crown Land known as Lot 7302 DP1181129 on the Site must be consulted with Council.</p>	<p>The comments made by Crown Lands have been noted.</p>

3.5 Heritage NSW

Submission	Response
<p>Heritage NSW have reviewed supporting documentation and provided comments for the Project Modification in relation to Aboriginal cultural heritage regulation matters below.</p> <p>In preparing the following advice for the Proposed Modification, Heritage NSW reviewed the following documents:</p> <ul style="list-style-type: none"> • Modification Report (AECOM, 2022) • Broken Hill Battery Energy Storage System Project Modification, Aboriginal Cultural Heritage Assessment Report – prepared by AECOM, dated February 2022. <p>The Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared in reference to the relevant guidelines as required by the SEARs to address the additional scope within the Modification Report (AECOM, 2022). It is noted that there are no registered Aboriginal sites, areas of Potential Archaeological Deposit (PAD), and Aboriginal Places located within the Modified Project development area. The archaeological survey was conducted as per the <i>Code of Practice Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW 2010). It is also noted that archaeological test excavation was also completed, where 10 test pits were excavated within the corridor, resulting in no Aboriginal artefacts identified.</p> <p>Heritage NSW notes the ACHAR recommendations to move and relocate artefacts prior to impact by qualified archaeologists and RAP field representatives' appropriate mitigation and management strategy. With this information, Heritage NSW comments they are satisfied with the additional ACHAR, field survey and test excavation program as adequate assessment of the Aboriginal cultural and heritage values in relation to the Proposed Modification. Heritage Notes there are no additional comments or concerns with the modification proceeding. Should further enquires be needed, contact with Nicole Davis from Heritage NSW is required.</p>	<p>The comments made by Heritage NSW have been noted.</p>

3.6 NSW Department of Regional NSW – Mining, Exploration and Geoscience

Submission	Response
<p>The NSW Department of Regional NSW (DRNSW) – Mining Exploration and Geoscience (MEG) reviewed the Modification Report (AECOM, 2022) and have commented with acknowledgement that the proponent will consult with the DRNSW-MEG as part of the preparation of a Biodiversity Stewardship Assessment Report if offsite offsetting is progressed as the mechanism to retire the Project's credit liability. DRNSW-MEG has noted that any enquiries regarding this information must be directed to the MEG-Geological Survey of NSW Land use Team at landuse.minerals@geoscience.nsw.gov.au.</p>	<p>The comments made by DRNSW have been noted. The retirement of these credits (ecosystem and species) can be made through either onsite offsets, offsite offsets, or payment to the Biodiversity Conservation Trust (BCT). Given the extent of development of the Modification Area, retirement of credits through onsite offsetting is considered unlikely. As such, it is likely that the credit liability for the Proposed Modification would be resolved through either or a combination of offsite offsetting and/or payment into the BCT.</p> <p>In the event offsite offsetting is considered the preferable mechanism to resolve the credit liability for the Proposed Modification, further consultation would be undertaken with MEG GNSW as part of the preparation of a Biodiversity Stewardship Assessment Report (BSAR). This commitment has been included as a management and mitigation measured (ID B5) in Appendix A.</p>

3.7 Transgrid

Submission	Response
<p>After reviewing the Modification Report (AECOM, 2022), Transgrid have commented:</p> <ol style="list-style-type: none"> 1. Transgrid will direct any queries through Lumea, 2. No further comments from Property since the original letter of consent for the Modification application for the Broken Hill BESS Facility dated 11/03/2022, 3. It is Transgrid's understanding that the PM has changed from Tony Varano to Swapnil Karkare from Transgrid's delivery team. 	<p>The comments made by Transgrid have been noted.</p>

3.8 Biodiversity Conservation Division

Submission	Response
Issue 1: Assessment area is incomplete and inconsistent with the Modification Report	
<p>The Biodiversity Conservation Division (BCD) have identified a discrepancy between the Modification Report disturbance area footprint and area assessed for the BDAR. Lots 57 and 58 containing the battery site were not assessed by the (Modification) BDAR.</p> <p>Furthermore, the BDAR does not mention if any previous assessment would be used to supplement the Modification BDAR, however the offset summary includes a credit requirement for 0.31 ha of PCT 155 matching the extent of native vegetation on the battery site.</p> <p>BCD commented that is their understanding that the Modification BDAR should have included an assessment of the disturbance at the battery site, as this assessment would replace the current project approval.</p> <p>Recommended Action:</p> <ol style="list-style-type: none"> 1. Revise the BDAR to include assessment of the whole disturbance area as described in the Modification Report. 	<p>The BDAR has been updated to include the assessment of the whole disturbance area, being consistent with the Modification Report (refer to Appendix B).</p>
Issue 2: Proposed staged credit retirement	
<p>BCD has opposed a staged approach for retiring biodiversity offset liability proposed by the BDAR. The stages are not included within the project described in the Modification Report (Section 4.3) and are not justified within the BDAR.</p> <p>Further to this, the BCD commented that the multiple revisions of the Biodiversity Assessment method (BAM) calculator (BAM-C) case to address the staging are confusing. They were not described in a way which references the vegetation zones or information in the BDAR.</p> <p>Recommended Action</p> <ol style="list-style-type: none"> 1. Revise the BDAR to remove staged credit retirement 2. Ensure the BAM-C case reflects the revised assessment and is clearly described in the BDAR. 	<p>The BDAR has been updated to reflect the whole disturbance area (i.e., project (as Modified)), as well as remove the reference to the staged approach to the credit retirement. To support this amendment, an updated BAM-C has been submitted with all the previous revisions being removed from the BOAMS. The outcome of the revised BAM-C has been provided in the revised BDAR that is provided in Appendix B.</p>

Submission	Response
Issue 3: BAM non-compliance	
<p>The BCD have identified and made comment that the minimum BAM requirements have not been met. Further comment was made to address that some of the issues identified as BAM non-compliance were raised as part of the approved project environmental impact statement (EIS). Repeated BAM non-compliance by Accredited Assessors will be referred to the DPE BAM accreditation team.</p> <p>BCD have identified that the mitigation measures proposed for managing the potential spread of high-threat weeds (African boxthorn (<i>Lycium ferocissimum</i>) and <i>Prosopis velutina</i>) and other pest plants, are inadequate at preventing any spread. BCD recommends a weed management strategy should be prepared and implemented before soil or vegetation disturbance occurs.</p> <p>Recommended Action BDC recommends for all issues to be resolved before the project is determined.</p>	
<p>1. Section 3.1.1 of the Modification Report (AECOM, 2022) should confirm if any species have been added to, or removed from, the BAM-C case since the submission of the approved project.</p>	<p>The following have been added/removed (automatically) from the BAM-C as part of the modification BDAR:</p> <ul style="list-style-type: none"> • Predicted species <ul style="list-style-type: none"> - Added – Black Falcon - Removed - Marble-faced Delma, Black-breasted Buzzard • Candidate species <ul style="list-style-type: none"> - Added – none - Removed – none <p>The BDAR has been updated to add Black Falcon and remove Marble-faced Delma and Black-breasted Buzzard from Table 14 of the BDAR. Marble-faced Delma and Black-breasted Buzzard were identified in the background review (BioNet), so will remain in Annex 5 of the BDAR.</p>
<p>2. Likelihood categories described in Section 3.1.1 should only be applied to ecosystem species which are not predicted by the BAM-C and exclusion of candidate species from the assessment can only be according to BAM in Section 5.2.3(2).</p>	<p>Likelihood categories are applied to all species recorded via the BioNet and PMST databases. While the table inclusion may not be a requirement of the BAM, it assists with developing context, addressing MNES assessments of significance and showing a method for why additional species might be added to the species credit list from BAM-C.</p> <p>The likelihood table does not, however, translate to excluding candidate or ecosystem species from the assessment. Niche Environment and Heritage consider the inclusion of these species to be an appropriate level of assessment for this location.</p>

Submission	Response
	<p>Niche Environment and Heritage note that section 5.2.3(2) of the BAM prescribes the requirements for exclusion and have added additional text within section 3.1.1 of the BDAR to clarify that the likelihood table does not impact the requirement to follow the BAM rules.</p>
<p>3. Provide justification for Low likelihood and exclusion of White-fronted Chat (ecosystem credit species) from the assessment. BCD noted that there is a BioNet record <2 km away from the site and there is a presence of PCT 155 on site which is listed in TBDC as habitat.</p>	<p>The original likelihood of the White-fronted chat was determined due to the lack of waterways in proximity to the site. However, the mobility of the species, the likelihood of White-fronted Chat to occur in the study area has been updated to moderate in the BDAR. Niche Environment and Heritage note that the White-fronted Chat has/was not excluded from the assessment (see Table 14 of the BDAR and Tab 4 of the BAM-C).</p>
<p>4. Provide a justification for exclusion of Crowned Gecko from the assessment. No evidence from the field survey and relevant literature has been provided to prove that the habitat has been degraded.</p>	<p>The development footprint is mapped, using BioNet, as an area where the Crowned Gecko (<i>Lucasium stenodactylum</i>) is predicted to occur (not known to occur). The closest records for the Crowned Gecko are over 100 km from the development footprint.</p> <p>Prior to 2007, the species was known as <i>Diplodactylus stenodactylus</i> and is known from Sturt National Park, Mutawintji National Park and Thurloo Downs. The species habitat is not well known but it has been found in red and sandy soil habitats, as well as savannah woodlands and shrubby stony areas (NSW Scientific Committee 2004).</p> <p>The development footprint is degraded and considered unsuitable for the Crowned Gecko due to the presence of European Rabbits and previous clearing and light to heavy vehicle movements evidenced by tracks, which has caused a reduction in the density of shrubs and ground cover and soil compaction both of which are required to provide shelter habitat. A reduction in shrub and ground cover also increases the risk of predation from cats and foxes.</p> <p>Given the multiple threats present, the degraded condition of the development footprint and the lack of nearby records, it is considered unlikely that the development footprint would qualify as habitat for the species. For these reasons, targeted searches for this species were not considered to be required. Furthermore, offset requirements have not been revised in the BAM calculator case.</p>

Submission	Response
<p>5. Provide evidence of the degradation of the habitat for the Thick-billed Grasswren (candidate species, SAI) to justify as to why this species was excluded from the assessment, as per the BAM in Section 5.2.3(2).</p>	<p>The Thick-billed Grasswren is considered vagrant due to its only known location in NSW being at Packsaddle, approximately 175 km to the north of Broken Hill. The Modification Area (disturbance footprint) is mapped as an area where the species is predicted to occur (not known to occur) (species profile) (DPIE 2022). The Modification Area (disturbance footprint) is considered outside of this species' normal distribution.</p> <p>The species usually inhabits dense, low saltbush, cottonbush, bluebush and nitre-bush areas on sandy plains or depressions in gibber. It also occurs along watercourses in clumps of Canegrass. In NSW, preferred habitat appears to be shrubland dominated by Blackbush (<i>Maireana pyramidata</i>) that is higher and denser than surrounding areas. None of the above features are present within the Modification Area and shrub density is low which is why this species was excluded from the assessment.</p>
<p>6. Include specific details for the mitigation measures in Table 15 of the Modification Report (AECOM, 2022) to ensure that all biodiversity impacts are avoided, minimised and mitigated.</p> <p>An example of this supplied by BCD is preparing a weed control strategy which is implemented before any clearing. This strategy would include extent of all weeds identified in BAM plots within disturbance points within the footprint and a 20m buffer, control of high threat weeds prior to disturbance and specifying vehicle hygiene measures for all vehicles and plant during construction.</p>	<p>During the field surveys, which informed the BDAR, two high threat weed (HTW) species were recorded, including African Boxthorn (<i>Lycium ferocissimum</i>) and <i>Prosopis velutina</i>. Both species are listed as priority weeds for the western region of NSW. A Weed Management Strategy (WMS) and relevant mitigation measures have been recommended / provided in the BDAR, including removal and chemical control of HTWs and other prevalent weeds.</p> <p>Control and mapping of all weeds is considered excessive given that some are small grasses or herbs, such as Medic, that have very minor cover in the area. The surrounding impacts of the locality are likely to render any such proposed actions futile. As detailed within Table 15 and 16 of the BDAR, the WMS would focus on the management and eradication of the existing HTW species within the disturbance footprint (summarised in Appendix B). This approach would involve a survey at the existing infestation locations (as identified within Section 3.1.4 of the BDAR), that would be completed prior to, and during construction activities. Furthermore, it is proposed that quarterly inspections of HTW would be undertaken for a 12 month period following the completion of construction activities.</p>

3.9 Public submission

Submission	Response
A submission was received from Mr Barry Laing in support of the Proposed Modification.	The comments made by Mr Barry Laing are noted.

4.0 Actions taken since exhibition

This section of the Submissions Report summarises the actions that have been taken since the lodgement of the Modification Report with DPE and during exhibition. Pursuant to the requirements of the guidelines, this section confirms the details of the Proposed Modification (**Section 4.1**), and details additional consultation that has been undertaken (**Section 4.2**), as well as a summary of further assessment of likely impacts (**Section 4.3**).

4.1 Proposed modification

4.1.1 Modification overview

AGL is seeking to modify SSD-11437498 to allow for the option of installing the 22 kV transmission connection belowground (in part or in full) along a revised alignment between the Site and the Transgrid Broken Hill substation. Similar to the approved connection corridor, the modification would require a construction corridor of approximately 20 metres wide across Lot 7302 DP 1181129.

This corridor would include the proposed transmission connection across Lot 7302 DP 1181129. Installation of the transmission connection belowground would involve crossing the ephemeral north-south drainage line and an unsealed vehicle track as shown in **Figure 4-1**. The full comparison of the approved Project description and the Proposed Modification description are provided in the Modification Report in Chapter 4 (AECOM, 2022). The consolidated Project Description is presented in **Table 4-1**. A consolidated figure that illustrates the comparison between the approved Project and the proposed modification has been provided as **Figure 4-2**.

Table 4-1 Consolidated Project Description

Project	Broken Hill Battery Energy Storage System (BESS)
Key features	<ul style="list-style-type: none"> Construction and operation of a BESS with a capacity of approximately 50 MW and up to 100 MWh; and Connection of the BESS to the nearby Transgrid Broken Hill substation via either a 22 kV overhead or belowground powerline connecting through a 22 kV busbar at the substation.
Proposed development	<p>The Project would be generally comprised of the following components:</p> <ul style="list-style-type: none"> Lithium-ion (Li-ion) batteries inside battery enclosures Inverters Medium voltage transformers up to 22 kV Cabling and collector units Connection to an existing 22 kV electrical switchyard including minor works to connect the BESS to the substation Temporary site office and then a permanent control and office building Asset Protection Zone (APZ) Site access, internal roads (including access), and car parking Drainage and stormwater management Other ancillary infrastructure including security fencing, lighting and CCTV.
Site description	<p>The proposed location of the Site is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). The Transgrid Broken Hill substation located at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040). The transmission connection between the Site and the Transgrid Broken Hill substation would traverse Lot 7302 DP 1181129. The Project Area is zoned IN1 General Industrial.</p>
Access	<p>Access to the Site would be via a new access point off Pinnacles Place. Access to Pinnacles Place and the wider Project Area is from Pinnacles Road. These roads are part of the existing primary road network in Broken Hill. A secondary access from the Site onto the unclassified road to the west of the Site (located on Lot 7302 DP 1181129) would be utilised during emergencies.</p>

Project	Broken Hill Battery Energy Storage System (BESS)
Grid connection	It is proposed to construct either an above ground or below ground 22 kV transmission connection from the Site to the Transgrid Broken Hill substation.
Construction	
Construction activities	<p>Construction works would involve:</p> <ul style="list-style-type: none"> • Enabling works • Civil, Structural, mechanical and electrical works • Commissioning • Demobilisation • A construction laydown area would also be provided on the Site.
Plant and equipment	<p>A range of plant and equipment would be used during construction. The final equipment and plant requirements would be determined by the construction contractor. Indicative plant and equipment has been broadly categorised into the following activities:</p> <ul style="list-style-type: none"> • Enabling works <ul style="list-style-type: none"> - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: <ul style="list-style-type: none"> - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Excavators - Graders - Scrapers - Compactors - Water trucks - Concrete trucks and pumps - Elevated work platforms - Cranes - Concrete saws and grinders - Compactors and rollers - Scrapers - Backhoe - Generators - Light vehicles, heavy rigid and articulated trucks (including multi trailer), low loaders. • Commissioning: <ul style="list-style-type: none"> - Elevated work platforms - Cranes - Generators - Light vehicles. • Demobilisation: <ul style="list-style-type: none"> - Heavy vehicles including road trucks - Water trucks - Backhoe - Compactors - Light vehicles. • Maintenance equipment: <ul style="list-style-type: none"> - Chainsaws - Tractors

Project	Broken Hill Battery Energy Storage System (BESS)
	<ul style="list-style-type: none"> - Light vehicles - Woodchippers/ mulchers.
Construction duration	Construction of the Project is intended to commence June 2022 and take approximately 12 months to complete.
Construction workforce	Up to 50 construction workers (at peak) would be required. These workers would be preferentially sourced locally where appropriate skill sets are economically available.
Construction hours	<p>The construction activities would be primarily carried out during standard construction hours, as defined by the <i>Interim Construction Noise Guideline</i>, being:</p> <ul style="list-style-type: none"> • 7am to 6pm, Monday to Friday • 8am to 1pm, Saturdays • No work on Sundays or public holidays.
Construction traffic volumes	Up to 50 light vehicles and 20 heavy vehicles per day at peak.
Operation	
Operational life expectancy	The Project has an initial design life of 20 years with components anticipated to be replaced or upgraded, as required, with the potential to extend the life beyond 20 years.
Operational workforce	The Project would be an unmanned facility that is managed remotely. One to three employees would be required periodically for maintenance activities.
Security	Up to a 2.7 metre high security fence would be constructed around the perimeter of the Site. All access to the Site would be controlled through an access point off Pinnacles Place. An emergency egress gate would be provided along the western boundary of the Site.
Typical operating scenario	The BESS is expected to operate on a 24 hour per day, seven days per week basis. The BESS is expected to undergo approximately one charge and discharge cycle per day, averaging approximately 255 full cycles per year. Based on a 50 MW facility, the Project would have a charge and discharge cycle of up to 100 MW/h.
Services and infrastructure	Existing services and utility infrastructure in the nearby vicinity would be extended, adapted and augmented to meet the demands of the Project.

4.1.2 Construction Program

An indicative schedule for construction is provided in **Table 4-2**:

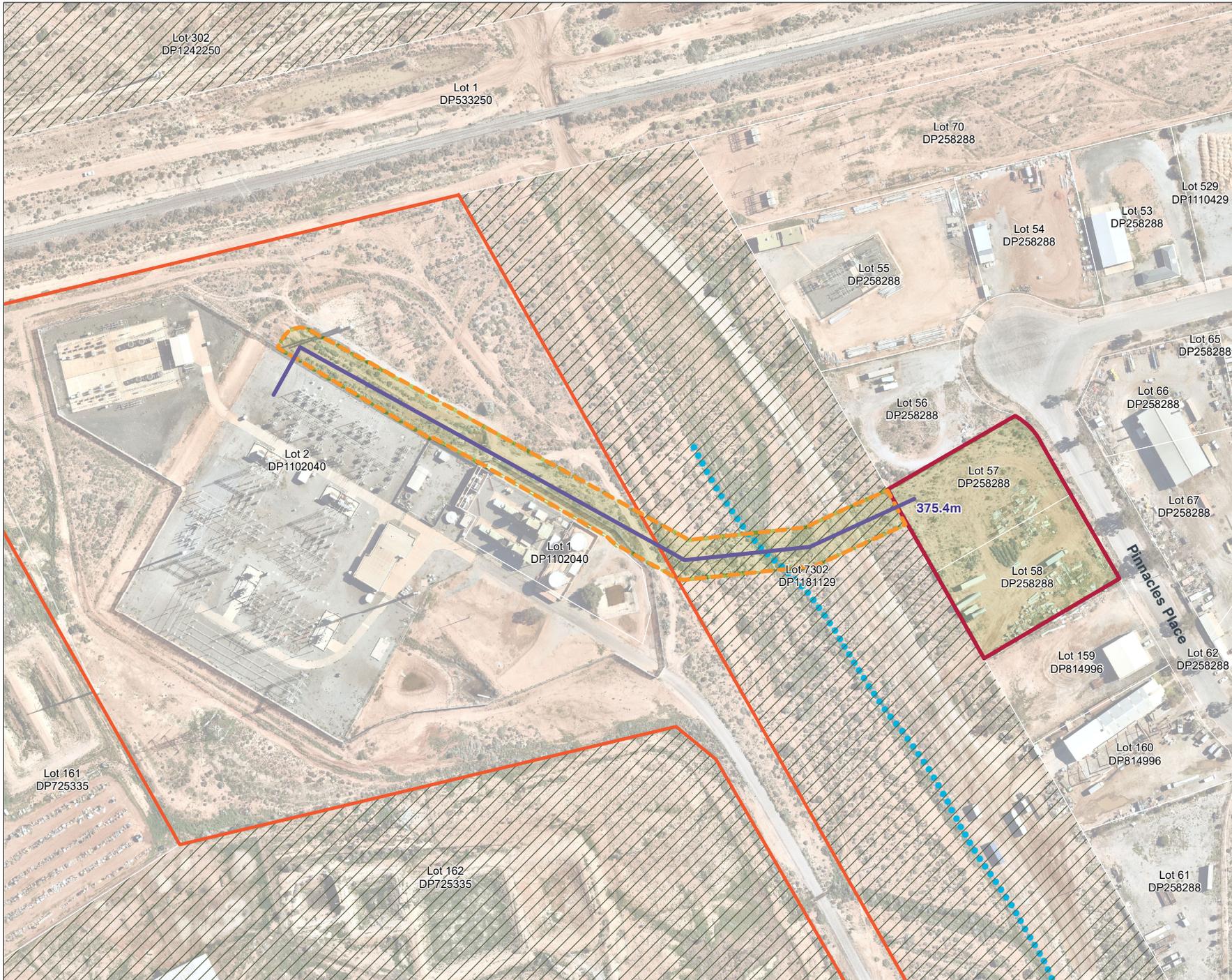
Table 4-2 Indicative construction schedule

Task / Stage	Date / Duration
Enabling works	Early 2022 – Mid 2022
Civil, structural, mechanical and electrical works	Early-Mid 2022 – Late 2022
Commissioning	Mid-Late 2022
Demobilisation	Late 2022 – Early 2023



Legend

- Site
- Transgrid Broken Hill Substation
- Commons
- Ephemeral Watercourse
- Proposed Commission Connection
- Modification Area
- Modification Area (Disturbance Footprint)



**FIGURE 4-1:
PROPOSED MODIFICATION**

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Indicative only, subject to detailed design.

Source: Imagery @ Nearmap, 2021



Legend

- Site
- Transgrid Broken Hill Substation
- Commons
- Ephemeral Watercourse
- Approved Transmission Line Pole Location
- Approved Overhead Transmission Line
- Proposed Commission Connection
- Modification Area
- Modification Area (Disturbance Footprint)
- Approved Project Area

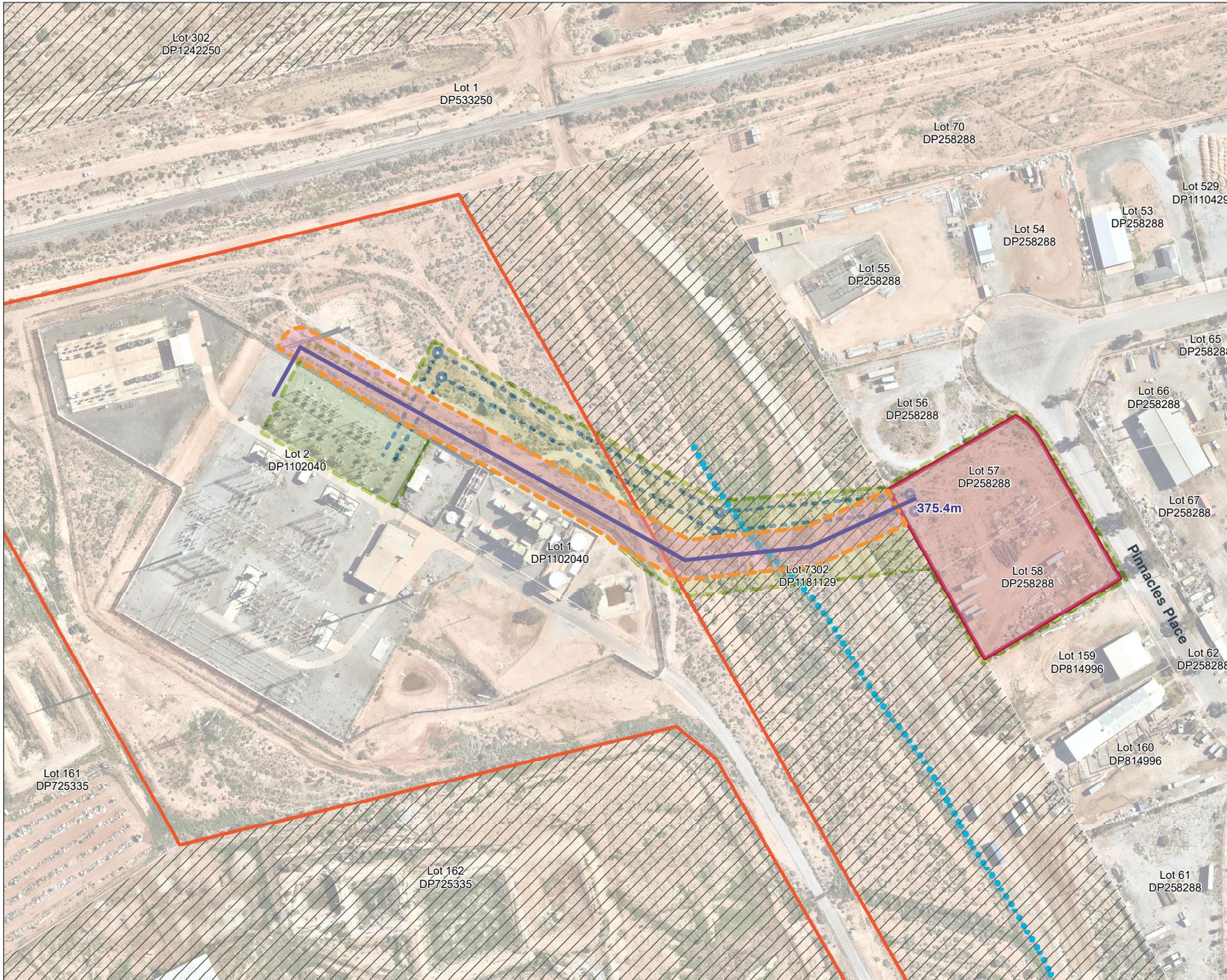


FIGURE 4-2:
COMPARISON BETWEEN
APPROVED PROJECT AND
PROPOSED MODIFICATION

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Indicative only, subject to detailed design.

Source: Imagery @ Nearmap, 2021

4.2 Consultation

4.2.1 Consultation objectives

The objectives of AGL's community engagement relating to the Project are to:

1. Communicate and engage with community members at an early stage to ensure the community feel meaningfully included during the planning and development phase
2. Inform the local community and stakeholders of upcoming milestones or key decision points, demonstrating AGL's commitment to transparency and accountability
3. Educate the local community and stakeholders through providing adequate explanations and information regarding how batteries contribute to the renewable energy transition
4. Minimise outrage or negative sentiment by identifying potentially impacted groups and individuals and working with them authentically to address their concerns
5. Establish a strong social licence to operate by understanding and meeting community expectations
6. Understand how AGL can positively contribute to the community for the Project
7. Meet regulatory community engagement requirements in accordance with the development application process.

Consultation undertaken during the Modification Report (AECOM, 2022) preparation with government agencies, non-government stakeholders and the community is summarised in Chapter 6 of the Modification Report (AECOM, 2022).

4.2.2 Consultation during exhibition

AGL has continued to engage with government agencies, non-government stakeholders and the community during the Modification Report exhibition period. This consultation is summarised below.

Government Agencies and Non-government agencies

AGL has undertaken consultation with Government Agencies and Non-Government stakeholders for the Proposed Modification. A summary of the consultation with relevant stakeholders is presented in **Table 4-3**.

Table 4-3 Government Agencies and Non-Government Stakeholders consultation summary

Stakeholder	Method	Date	Response
Jim Hickey – Deputy Mayor, Broken Hill	In person	25/3/22	Positive – welcomed the development
Mark Coulton, Federal Member for Parkes	In person	25/3/22	Positive - cited investment in clean energy as critical to the future for the mining region of NSW
Silverton Wind Farm CCC	In person	5/5/22	Welcoming of new energy projects

4.2.3 Consultation during construction

Community engagement will be maintained throughout the construction of the Project (as modified). Continued community consultation and engagement, through the means of social and traditional media, will aim to encourage community involvement in the Project (as modified). A specific email address, dedicated phone number and online forum would be set up to receive and address any expressions of interest from the community.

4.3 Further assessment of impacts

The BDAR was updated in response to the comments received by the Biodiversity Conservation Division (refer to **Section 3.8**). The updated BDAR has been provided as **Appendix B** to this Submissions Report.

The updated BDAR describes the ecological values related to the approved Project (as modified) as per the BAM and determines whether the proposed modification is likely to have an impact on threatened biodiversity listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The biodiversity assessment for the proposed modification did not include any field survey and relies on the survey work undertaken (in 2019/20) as part of the approved Project by Niche (2021) in accordance with the BAM.

The methods conducted by Niche (2021) included the following:

- Modification Area walkover to map the type and extent of native vegetation and determine habitat for threatened biodiversity.
- Collection of floristic and habitat data from four BAM plots and one Rapid Data Point (RDP).
- Targeted surveys for threatened flora species.
- Targeted fauna survey was not undertaken due to the lack of potential habitat in the Modification Area.

The proposed modification would potentially result in the following:

- Direct removal of 0.9 hectares (ha) of low condition native vegetation (largest possible clearing extent)
- Removal of 0.9 ha of fauna habitat (i.e., native vegetation).

Further detail regarding the amendments to the BDAR in response to BCDs submission is provided in **Section 3.8**.

Results

One plant community type (PCT) was mapped within the Modification Area:

- PCT 155 Bluebush shrubland on stony rises and downs in the arid and semi-arid zones.

PCT 155 does not align to a Threatened Ecological Community (TEC) listed in the BC Act or EPBC Act. As a result, the proposed modification would not impact on any TECs listed in the BC Act or EPBC Act.

No threatened flora was recorded within the Modification Area, and no threatened flora is considered to have a moderate or higher likelihood of occurrence in the Modification Area.

No threatened fauna species were recorded within the Modification Area. Eight threatened fauna species are considered to have a moderate likelihood of occurrence in the Modification Area, mostly because they are highly mobile or wide-ranging species. One of these, Australian Bustard (*Ardeotis australis*) is a credit species and is assumed to use the site on occasion.

Avoid/mitigate impacts

Measures to reduce the impact of the Modification on local flora and fauna are detailed in the updated BDAR and include siting of the proposed modification within a low impact area, staff training, erosion and sediment controls, weed control measures, and management and removal of waste related to the proposed modification. These management and mitigation measures have been summarised in **Appendix A** of this Submissions Report.

5.0 Update project justification

This Submissions Report addresses the requirement to consider and respond to all submissions received during the exhibition of the Modification Report. Overall, the Modification Report (AECOM, 2022) and this Submissions Report have concluded that the Project as proposed to be modified should proceed as it would:

- Be located in close proximity to key power utility infrastructure and identified future growth zones with regards to investment in renewable energy infrastructure. In this location, the Project would deliver critical energy infrastructure that would support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region
- Be located on a site that, when compared to other options, presents environmental impacts that are equal to or less than other available options in the surrounding area
- Be located on a site which is on, and surrounded by, land which is zoned IN1 General Industrial, meaning that the Project would be compatible with the existing land uses during construction and operation
- Provide adequate separation from sensitive receivers
- Provide for the advantageous, orderly and economic use of land in a landscape that has a history of power generation and transmission alongside various rural and industrial land uses
- Meet the objectives of the approved Project
- Satisfy the principles of ESD as described in the EP&A Act.

For these reasons, the benefits of the Proposed Modification would outweigh potential impacts and the Proposed Modification is considered to be in the public interest. Based on the findings detailed within this Modification Report (AECOM, 2022), the Proposed Modification is considered to be justified and is recommended to proceed subject to consent.

This Submissions Report further demonstrates that the Proposed Modification is appropriately located (as confirmed by Broken Hill City Council) and can be undertaken in a manner that would not result in significant impacts on the local community or the environment. The Modification Report (AECOM 2022) and this Submissions Report has concluded that the modification works should proceed because they would:

- Result in no long-term adverse impacts to the environment or local community
- Ensure the primary objectives of SSD-11437498 to provide energy support to the town of Broken Hill continue to be achieved.

The benefits of the Proposed Modification are considered to outweigh the limited environmental and social impacts, and as such the Proposed Modification is considered justified and worthy of development consent.

6.0 References

AECOM (2021), Broken Hill Battery Energy Storage System Project Environmental Impact Statement.

AECOM (2022), Broken Hill Battery Energy Storage System Project Modification Report.

Department of Environment and Climate Change and Water (DECC) (2008). Managing Urban Stormwater: Soils and Construction Volume 2A (the Blue Book).

Appendix A

Updated mitigation
measures

Appendix A Updated mitigation measures

Management and mitigation measures

The overarching approach to environmental management during the construction and operation of the Proposed Modification is guided by the following:

- Management and mitigation measures
- Conditions of consent for SSD-11437498
- Construction Environmental Management Plan (CEMP) and sub-plans
- Operation Environmental Management

Management and mitigation measures

Management and mitigation measures that would be implemented for the Modified Project to address potential environmental and social impacts are listed in **Table A-6-1**.

These measures may be further amended following review of the draft conditions of consent to ensure they are consistent with potential future requirements relating to the development consent. Consistency changes at this point will be discussed and agreed with DPE.

Where additions have been made to the mitigation measures that were agreed as part of the approved Project as a result of the assessment completed for this modification application, they are shown in bold.

Table A-6-1 Management and mitigation measures

ID	Management and mitigation measure	Timing
General		
G1	AGL would prepare and implement a CEMP and sub-plans for the Project, which include the measures outlined in this table, relevant conditions of consent and the relevant requirements of other approvals.	Construction
G2	AGL would appoint an Environmental Management Representative to monitor the implementation of all environmental management measures. The EMR would ensure that conditions of consent and management and mitigation measures are being met or effectively applied during construction and that the work is being carried out in accordance with the relevant CEMP and other relevant requirements.	Construction
G3	Community engagement would be maintained throughout the construction of the Project. A specific email address, dedicated phone number and online forum would be set up to receive and address questions, comments and concerns from the community.	Construction
G4	Broken Hill City Council (as nominated by CASA) would be consulted regarding works within the Project Area utilising cranes.	Construction
Biodiversity		
B1	A Biodiversity Management Plan would be prepared and include the following measures: <ul style="list-style-type: none"> • Establish an exclusion zone around the area of PCT 155 in moderate condition, to ensure it would not be impacted by the Project 	Construction

ID	Management and mitigation measure	Timing
	<ul style="list-style-type: none"> • If the above ground transmission connection option is chosen, establish an exclusion zone so that the transmission line poles would not be placed within 10 metres either side of the 1st order stream. No vegetation clearing outside of the disturbance footprint should occur within the riparian corridor if the above ground transmission connection option is chosen. • Undertake staff training to communicate the importance of exclusion zones, erosion and sediment controls, unexpected species and finds procedures • Outline hygiene protocols to prevent the spread of weeds or pathogens between affected areas and unaffected areas • Outline weed control measures to manage the potential dispersal and establishment of weeds during construction in accordance with the <i>Biosecurity Act 2015 (Cth)</i>. 	
B2	Following construction activities in the transmission connection, appropriate native vegetation will be planted where project activities have removed vegetation to revegetate these areas and reduce erosion.	Construction
B3	Weed control measures would form part of operational maintenance to manage the potential dispersal and establishment of weeds during operation in accordance with the <i>Biosecurity Act 2015 (Cth)</i> , and the specific management measures provided in Table 15 and 16 of the BDAR.	Operation
B4	AGL would meet their offsetting requirements of this Project as determined by the BAM-C following detailed design.	Operation
B5	Consultation would be undertaken with NSW Department of Regional NSW – Mining, Exploration and Geoscience as part of the preparation of a Biodiversity Stewardship Assessment Report (BSAR), if offsite offsetting is progressed as the mechanism to retire the Project's credit liability.	Construction
B6	If the option to install the transmission connection belowground is chosen, once the transmission cables and related infrastructure are laid in the trench, the trench would be backfilled as soon as practicable, and the surface rehabilitated to pre-development conditions that would not result in significant hydrological changes.	Construction
Aboriginal heritage		
AH1	An Aboriginal Heritage Management Plan (Plan), which would form part of the Project CEMP, would be prepared for the Project in consultation with BHLALC. The Plan would include the findings of the archaeological survey. It would also include the following measures: <ul style="list-style-type: none"> • As a precaution, demarcation would be placed around BESS-AS1-21, the two lithic items identified by RAPs (Lithic item 1 539897E 6461017N GDA 	Construction

ID	Management and mitigation measure	Timing
	<p>Zone 54, Lithic item 2 539833E 6460989N GDA Zone 54) prior to works in the area</p> <ul style="list-style-type: none"> • If demarcation is not possible, the surface artefacts present within the boundary of the BESS-AS1-21 site would be relocated to an area nearby that would not be impacted by the Project. Artefact relocation would be undertaken by a qualified archaeologist and appropriate number of RAP field representatives with the RAPs determining the final artefact location. Once complete, the site card for BESS-AS1-2021 would be updated to reflect implementation of this mitigation measure. • In the event that unexpected Aboriginal items are identified during construction, works within the vicinity of the find would immediately cease. The Construction Contractor would immediately notify the Project Manager and the Environment Manager so they can assist in coordinating the next steps. These would include engaging a suitably qualified archaeologist and RAP representative to determine the nature, extent significance of the site and provide appropriate management advice. Management action(s) would vary according to the type of evidence identified, its significance (both scientific and cultural) and the nature of potential impacts • In the event that potential human skeletal remains are identified within the Project Area during construction, all work in the vicinity of the remains would cease immediately and the standard procedures set out in the NSW Police Force Handbook (2014); and NSW Health Exhumation of Human Remains Policy (2013) would be followed. 	
Non-Aboriginal heritage		
NAH1	The CEMP for the Project would include stop work procedures to manage activities in the unlikely event that intact archaeological relics or deposits are encountered.	Construction
Soils, groundwater and contamination		
C1	A Remedial Action Plan would be prepared in accordance with <i>State Environmental Planning Policy No 55 – Remediation of Land</i> for the excavation of localised petroleum hydrocarbon impacted material within the vicinity of the intermediate bulk container at the southern boundary of the Site.	Construction
C2	<p>The CEMP would detail procedures for the management of soils, contamination, and water, in line with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) and the <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR 2018). A Soil and Water Management Plan (SWMP) would be included as part of the CEMP. This SWMP would include:</p> <ul style="list-style-type: none"> • Measures to manage erosion and stormwater • Stockpile management procedures for segregating spoil and preventing cross-contamination of clean 	Construction

ID	Management and mitigation measure	Timing
	<p>spoil (virgin excavated natural material or excavated natural material) with potentially contaminated soil</p> <ul style="list-style-type: none"> • Measures for stockpiles and storage areas to be located near the upstream (eastern) end of the Site, to prevent any loose materials being washed away into the downstream drainage system • Procedures for handling and storing spoil, including potentially or known contaminated soil/fill in accordance with the POEO Act, and protocols for waste classification and tracking for off-site disposal • Measures to manage the unexpected interception of groundwater during construction • Measures to manage unexpected contamination finds during construction • Emergency response measures including clean-up and reporting procedures • The approach for rehabilitating the land that is disturbed during construction of the transmission connection to broadly pre-development condition. 	
C3	<p>A site inspection would be undertaken to confirm that no additional spills occurred during the removal of plant/machinery drums, intermediate bulk containers, jerry cans containing waste oils and mechanical fluids. The SWMP would outline the process to follow if stained or odorous soils are noted following the removal of this waste material or during construction of the Project.</p>	Construction
C4	<p>In the event that material is required to be taken off-site for the installation of the proposed transmission line poles (e.g. within the transmission connection), samples of material would be collected to allow for waste classification in accordance with the NSW EPA (2014) <i>Waste Classification Guidelines</i>.</p>	Construction
Noise and vibration		
NV1	<p>A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP prior to commencing construction of the Project. The CNVMP would include:</p> <ul style="list-style-type: none"> • Identification of nearby residences and other sensitive land uses • Description of approved construction hours • Description and identification of all construction activities, including work areas, equipment and duration • Description of what work practices (generic and specific) would be applied to minimise noise and vibration • Measures to ensure the speed of vehicles would be limited and the use of engine compression brakes would be avoided, where appropriate • A complaint handling process • Overview of community consultation required for identified high impact works 	Construction

ID	Management and mitigation measure	Timing
	<ul style="list-style-type: none"> Provisions for consultation with Transgrid about managing potential noise impacts to on-site workers (if present) during the transmission connection works Provision for consultation with adjacent industrial premises about the nature and duration and of noise impacts. 	
NV2	<ul style="list-style-type: none"> The CNVMP would outline minimum working distances for vibration intensive works. Vibration intensive works which do not comply with minimum working distances would not proceed unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective. 	Construction
Transport and access		
T1	<p>A Construction Traffic Management Plan (CTMP) would be prepared, in consultation with Broken Hill City Council and other relevant stakeholders, and include the following measures:</p> <ul style="list-style-type: none"> Vehicle access to and from the Project Area would be designed and managed to minimise safety risk to pedestrians, cyclists and motorists and to help ensure that construction vehicles can safely enter the Site. All trucks would enter and exit the Project Area in a forward direction and outside of peak periods, where this is feasible, to minimise traffic impacts on the surrounding network during the peak periods Near the site access, appropriate signage, line marking and/or traffic control measures would be used to direct and guide pedestrians, cyclists and motorists past the Project Area during high usage times Construction worker parking along Pinnacles Place and on-site would be reviewed as required to understand if the local parking capacity is likely to be exceeded and whether additional measures are required to reduce parking demand (e.g. shuttle buses). 	Construction
Surface water, flooding and water use		
SW1	<p>A Soil and Water Management Plan (SWMP) would be included as part of the CEMP. This SWMP would be prepared in accordance with <i>Managing Urban Stormwater: Soils and Construction – Volume 1</i> (Landcom, 2004) and would include the following:</p> <ul style="list-style-type: none"> plans for temporary drainage or drainage diversions to be implemented during construction to control concentrated flows, avoid impeding stormwater flows, ensure flows are not directed onto adjacent properties and construction is not impacted by site runoff. erosion and sediment control measures to minimise the erosion potential and sediment production across the Project Area. 	Construction

ID	Management and mitigation measure	Timing
	<ul style="list-style-type: none"> • details of potable water requirements during construction • Measures to cease works within the Lot 7302 DP1181129 and secure equipment when a severe weather warning is issued for the immediate area. 	
SW2	<p>The Site drainage system would:</p> <ul style="list-style-type: none"> • be designed to cater for an increase in flows generated by the Site to limit post-development flows to pre-development flows in all events up to and including a 1% AEP storm event. • incorporate water sensitive urban design features such as vegetated swales and pervious areas, where possible, to treat stormwater runoff generated by the Site in order to meet the water quality targets outlined in the ANZG guidelines. This would reduce the amount of pollutants generated through Site operations, such as general litter, vehicle by-products, sediments and nutrients, leaving the Site and entering the receiving environment. • include scour protection (e.g., rock) or an energy dissipator would be installed on-site and/or at the Site's stormwater discharge point to reduce the risk of scouring and the transport of sediment downstream. <p>The design for stormwater management system at the Site would be discussed with Broken Hill City Council prior to being finalised.</p>	Operation
SW3	Site buildings would incorporate a roof drainage system, designed in accordance with Australian Standards, that safely discharges roof runoff to the Site's surface water drainage system and rainwater tanks to prevent roof runoff from eroding soils.	Operation
SW4	The battery design would incorporate spill containment measures to prevent battery spillage from entering the Site drainage system or downstream waterways.	Operation
SW5	The requirement for additional measures to protect the transmission line poles from floodwaters within Lot 7302 DP1181129 would be determined during detailed design.	Operation
SW6	Maintenance works along the transmission connection would be undertaken in a manner that minimises the disturbance to soils and local vegetation.	Operation
SW7	The office buildings, inverters, transformers and batteries would be elevated above surface level on concrete pads to protect them from potential floodwater impacts.	Operation
SW8	<p>The following measures would be included in the SWMP if the option to install the transmission line belowground is chosen:</p> <ul style="list-style-type: none"> • Weather forecasts would be reviewed daily to identify periods where rainfall and particular heavy rainfall would be unlikely to occur. Excavation works for the transmission connection would not occur if heavy rainfall is expected with 24 hours or during periods of rainfall. If heavy rainfall is expected within 24 	Construction

ID	Management and mitigation measure	Timing
	<p>hours trenches would be backfilled and surface soils stabilised.</p> <ul style="list-style-type: none"> • Access to the modification area would utilise existing access roads and tracks where possible to minimise the disturbance of existing surfaces and vegetation. • The construction footprint would be limited to a 4 metre width and trenching would be a maximum width of 1.0 metre. • Cables would be installed at least 1.0 metre below the surface, which is below the expected scour depths given the flows through the ephemeral drainage line. • Excavated soil would be temporarily stored alongside the trench if to be used as backfill, while imported backfill (if required) would be stored at a separate location outside of the existing watercourse (i.e., 10 metre either side of the drainage line). • Cable installation and backfilling within the trench would be continuously undertaken along the length of transmission connection route to minimise the duration for which the trench is open, and stockpiles are present. • Laydown areas would be located outside of the existing watercourse (i.e., 10 metre either side of the drainage line) to prevent flow obstruction and sediment/pollutant transportation via surface water. • The construction duration for the modification is minimised to reduce the risk of any potential impacts. • A rehabilitation plan would be included as part of the SWMP to outline the approach for rehabilitating the land that is disturbed during construction of the transmission connection to broadly pre-development condition. This plan would: <ul style="list-style-type: none"> - ensure trench backfilling restores the channel shape and bed level to maintain the existing hydraulic capacity of the watercourse - outline proposed vegetation planting to help stabilise the soils where excavations have occurred. 	
SW9	If the option to install the transmission connection belowground is chosen and a rehabilitation plan is required, this plan would be included under any operational environmental management system if monitoring or maintenance is required post-construction.	Operation
Bushfire		
BF1	A 10.5 metre Asset Protection Zone (APZ) would be implemented between the western boundary of the Site	Operation

ID	Management and mitigation measure	Timing
	and assets of the Project (i.e., battery units, inverters and transformers).	
BF2	The proposed internal road would comply with the <i>Planning for Bushfire Protection 2019</i> design and construction standards for property access roads (Table 5.3b).	Construction and operation
BF3	The vegetation clearance distance to any overhead transmission lines within the Project Area would comply with the document ISSC 3 Guideline for Managing Vegetation Near Power Lines (Industry Safety Steering Committee 2005).	Operation
BF4	A 'Bushfire Emergency Management and Evacuation Plan' would be prepared in accordance with the RFS document 'A Guide to Developing a Bushfire Emergency Management and Evacuation Plan' (RFS 2014) for the construction and operation phases of the Project.	Construction and operation
BF5	<p>The Project Area would be maintained to achieve the performance requirement of an Inner Protection Area (IPA) as described by Appendix 4 of <i>Planning for Bushfire Protection 2019</i>. The following landscaping recommendations would be adopted to achieve the IPA for the Project:</p> <ul style="list-style-type: none"> • Trees at maturity would be maintained so as not to contact or overhang assets • Tree canopies would not be connected when at maturity. Gaps between crowns or groups of crowns would be maintained at distances of two to five metres • Preference would be given to smooth barked and evergreen trees • Shrubs would not be planted within the Project Area. Screen and buffer planting along the eastern boundary of the Site (adjacent Pinnacles Place) would be permitted. • Grass would be kept mown (no more than 100 millimetres in height) • Leaves and vegetation debris would be regularly removed • Organic mulch would not be used within 2 metres of a structure or asset within the Project Area. 	Operation
Hazards and risk		
HR1	All hazardous substances that would be required for construction and operation would be stored and managed in accordance with the <i>Work Health and Safety Act 2011</i> (NSW and Commonwealth) and the <i>Work Health and Safety Regulation 2017</i> (NSW), <i>The Storage and handling of flammable and combustible liquids guidance material 2020</i> (as applicable), Hazardous and Offensive Development Application Guidelines (Applying SEPP 33) (Department of Planning, 2011) and the requirements of the <i>Environmentally Hazardous Chemicals Act 1985</i> (NSW).	Construction and operation
HR2	Construction site planning would ensure hazardous materials are stored appropriately and at an appropriate	Construction

ID	Management and mitigation measure	Timing
	distance from receivers, in accordance with the thresholds established under Hazardous and Offensive Development Application Guidelines (Applying SEPP 33). Should the minimum buffers be unable to be maintained, either due to space constraints, the close proximity of sensitive receivers, or requirements to store volumes of hazardous materials in excess of storage thresholds, a risk management strategy would be developed on a case-by-case basis.	
HR3	The separation distance between infrastructure within the BESS would be determined in accordance with Codes and Standards and manufacturer's recommendations, including all relevant requirements in the Australian Standard 5139 (2019) are to be adhered to at the BESS. Adherence to requirements in international Standards would also be considered, for example, to the US NFPA 855 (2020) Code.	Operation
HR4	The requirement for a detailed firefighting response (e.g. in the format of a Fire Safety Study) would be determined in consultation with DPE, NSWFR and the RFS.	Operation
HR5	Protection against loss of containment would be managed through batteries being specifically housed in dedicated enclosures, with only restricted personnel permitted within the Site. Spill clean-up equipment would be made available, as detailed in a Pollution Incident Response Management Plan (PIRMP).	Construction and operation
HR6	The specific risk associated with the potential for dust storms and ingress of dust causing damage to infrastructure would be considered into the design of the BESS.	Operation
HR7	The register of commitments (Appendix 1 of Appendix J Preliminary Hazard Analysis) is integrated into the management for the Project. This includes integration of 36 individual commitments, including for the design, installation and maintenance of the BESS automatic shutdown system on exceedance of safe limits; installation of deflagration venting and fire protection inside the battery enclosures; design of the BESS such that the risk of pollution from a release is reduced to ALARP; installation of protective barriers (e.g. at the transformers); fire resistance of the battery enclosures; and application of a rigorous and formal management of change process for the Project, including hazard identification and risk assessment processes.	Operation
Visual		
V1	Lighting of the Site would be designed in accordance with <i>AS 4282:2019 Control of the obtrusive effects of outdoor lighting</i>	Operation
Social and economic		
SE1	All businesses, residential properties and other key stakeholders affected by the Project would be notified at least five working days prior to commencement of construction. The notification would include:	Construction

ID	Management and mitigation measure	Timing
	<ul style="list-style-type: none"> • Details of the Project • Construction period and construction hours • Complaint and incident reporting and how to obtain further information 	
SE2	Complaints received from the community would be recorded, monitored and acted upon	Construction
SE3	Local services and materials would be prioritised for the Project as far as practical	Construction
Waste		
W1	<p>A Waste Management Sub-Plan would be prepared as part of the CEMP. The Sub-Plan would:</p> <ul style="list-style-type: none"> • Identify requirements consistent with the waste and resource management hierarchy and cleaner production initiatives • Include relevant measures from the National Waste Policy: Less Waste, More Resources (Department of Agriculture, Water and the Environment, 2018) • Incorporate any relevant waste disposal requirements specified in the Remedial Action Plan for the excavation and disposal of contaminated soils from the 'Tank sample location' • Provide a framework so that resource efficiency is delivered through the design and construction practices • Provide consistent clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures • Specify protocols for classification of waste materials for off-site disposal or assessment under a resource recovery exemption • Set out processes for disposal, including on-site transfer, management and the necessary associated approvals/permits. Waste generated would be regularly removed from Site, in order to avoid potential issues associated with odour, visual amenity and attracting animals/pest species • Outline procedures for waste generated within the Project area to be segregated at source and suitably stored in designated waste management areas within the Project area • Include material tracking measures to track waste and recyclables generated from the Project and removed from the Project area. Material tracking records would include types, volumes and management measures for waste and resources arising from/used for the Project. 	Construction
W2	All waste would be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (NSW EPA, 2014a). A waste classification letter would be prepared to allow for materials to be disposed off-site to a licensed landfill in accordance with NSW EPA guidelines (e.g., material from the tank sample location excavation area, the proposed transmission pole locations and any materials surplus to Site requirements).	Construction and operation

ID	Management and mitigation measure	Timing
Air quality		
AQ1	<p>The CEMP would include air quality management measures including:</p> <ul style="list-style-type: none"> • Daily construction activities would be planned to take into account the expected weather conditions for each workday. Regular dust observations to be undertaken of active excavation or stockpiling areas. The aim is to ensure visible dust is not moving off-site and that areas needing additional management measures be identified early. • Minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable • Implement dust suppression measures on exposed surfaces, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to minimise dust generation • Establish defined Site entry and exit points to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of off-site track out of dirt is identified • Cover heavy vehicles entering and leaving the Site to prevent material escaping during transport • Keep vehicles and construction equipment operating on-site well maintained and turned off when not operating (minimise idling on the Site) • Minimise the handling of spoil when excavating and loading of vehicles. 	Construction

Construction Environmental Management Plan

The CEMP for the approved Project would be updated to include the proposed option for transmission connection. The CEMP would address the relevant requirements of the planning approval documentation (including mitigation measures and conditions of consent). The CEMP would include sub-plans for the management of environmental matters where more detail is required.

Operational Environmental Management

Environmental performance during operation of the Modified Project would be managed by the implementation of an OEMP. The OEMP would detail how the management and mitigation measures identified in **Appendix A** would be implemented and achieved during operation and would specify the environmental management practices and procedures to be followed. The OEMP would include the following:

- A description of activities to be undertaken during operation
- Statutory and other obligations, including approvals, consultations and agreements required from authorities and other stakeholders
- The relevant measures included in **Appendix A**.
- Overall environmental policies, guidelines and principles to be applied to operation
- A description of the roles and responsibilities, including relevant training and induction to ensure that employees are aware of their environmental and compliance obligations
- An environmental risk analysis to identify the key environmental performance issues associated with the operation phase
- Details of how environmental performance would be managed and monitored.

Appendix B

Biodiversity Development Assessment Report

Appendix B Biodiversity Development Assessment Report

Broken Hill Battery Energy Storage System Project Modification 1

Biodiversity Development Assessment Report

Prepared for AGL Macquarie Pty Ltd | 6 June 2022



Project number	Client	Project manager	LGA
5475	AECOM	Simon Tweed	Broken Hill

Declaration

This Biodiversity Development Assessment Report has been prepared on the basis of the requirements of (and information provided under) the Biodiversity Assessment Method as certified by BAM Accredited Assessor: Stephen Bloomfield (BAAS 18054)



Version	Author	Review/Comment	Status	Date
Rev1	Freya Gordon	Simon Tweed	Draft	09/03/2021
Rev2	Freya Gordon	Minor changes	Draft	12/03/2021
Rev3	Freya Gordon	Minor changes	Final	29/04/2021
Rev4	Freya Gordon	Minor changes	Final	19/05/2021
Rev5	Freya Gordon, Stephen Bloomfield	Update to reflect project modification	Final	26/11/2021
Rev6	Stephen Bloomfield	Address AECOM comments	Final	09/12/2021
Rev7	Stephen Bloomfield	Address AECOM comments	Final	15/12/2021
Rev8	Stephen Bloomfield	Address AGLM comments	Final	12/01/2022
Rev9	Stephen Bloomfield	Address AGLM comments	Final	24/01/2022
Rev10	Stephen Bloomfield	Address Ashurst comments	Final	04/02/2022
Rev11	Stephen Bloomfield	Address BCD comments	Final	10/05/2022
Rev12	Stephen Bloomfield	Address AGLM comments	Final	06/06/2022

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Executive summary

Context

AGL Energy Limited has received development consent to construct, operate and maintain a Battery Energy Storage System (BESS) facility of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) in capacity at Broken Hill (the approved Project) (SSD-11437498). The location of the Project is at two lots located at 74 to 80 Pinnacles Place, Broken Hill NSW 2880 (Lots 57 and 58 of DP 258288) (the Site). The Site is close to the Transgrid Broken Hill substation located at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040). Consent has been granted for the installation of an overhead transmission connection between the Site and the Transgrid Broken Hill substation, which will traverse Lot 7302 DP1181129.

Following approval of the Project, Transgrid requested AGL Macquarie Pty Ltd (AGLM) modify the connection location at their substation. This requires the transmission line to connect to a location further to the north-west on the substation site. As a result, the proposed overhead BESS transmission line will now cross the alignment of existing transmission lines that extend from the substation. In order to cross these existing transmission alignments, the transmission line may need to be installed underground in part or in full between the Site and the Transgrid Broken Hill substation (the 'Modification Area'). The installation of the transmission line underground was not assessed as part of the Project and, as such, requires a modification to SSD-11437498.

If installed underground, the transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximate 720 millimetre wide trench using a rubber tracked mini excavator or similar to minimise any potential environmental impacts
- require a disturbance footprint approximately four metre wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

AECOM Australia Pty Ltd (AECOM) has been commissioned by AGLM to prepare a Modification Report for a modification application under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project.

AECOM commissioned Niche Environment and Heritage Pty Ltd (Niche) to prepare a Biodiversity Development Assessment Report (BDAR) to accompany the application for the Modification.

The approved Project is located at 74 to 80 Pinnacles Place, Broken Hill NSW 2880 and encompasses Lots 57 and 58 of DP285288, part of Lot 7302 of DP1181129 (for the transmission line corridor), and part of Lot 2 DP1102040 (for the connection of the transmission line to the substation).

This report describes the ecological values within the Modification Area as per the Biodiversity Assessment Methodology (BAM) (Department of Planning, Industry and Environment [DPIE] 2020a) and determines whether the Modification is likely to have an impact on threatened biodiversity listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The biodiversity assessment for the Modification did not include any field survey and relies on the survey work undertaken (in 2019/20) as part of the Approved Project by Niche (2021) in accordance with the BAM. The methods conducted by Niche (2021) included the following:

- Modification Area walkover to map the type and extent of native vegetation and determine habitat for threatened biodiversity.
- Collection of floristic and habitat data from four BAM plots and one Rapid Data Point (RDP).
- Targeted surveys for threatened flora species.

Targeted fauna survey was not undertaken due to the lack of potential habitat in the Modification Area.

Results

One plant community type (PCT) was mapped within the Modification Area:

- PCT 155 *Bluebush shrubland on stony rises and downs in the arid and semi-arid zones*.

PCT 155 does not align to a Threatened Ecological Community (TEC) listed in the BC Act or EPBC Act. Therefore, the Modification would not impact on any TECs listed in the BC Act or EPBC Act.

No threatened flora was recorded within the Modification Area, and no threatened flora is considered to have a moderate or higher likelihood of occurrence in the Modification Area.

No threatened fauna species were recorded within the Modification Area. Eight threatened fauna species are considered to have a moderate likelihood of occurrence in the Modification Area, mostly because they are highly mobile or wide-ranging species. One of these, Australian Bustard (*Ardeotis australis*) is a credit species and is assumed to use the site on occasion.

Impact assessment

The Modification would potentially result in the following:

- Direct removal of 0.91 hectares (ha) of native vegetation (largest possible clearing extent)
- Removal of 0.91 ha of fauna habitat (i.e. native vegetation).

Avoid/mitigate impacts

Measures to reduce the impact of the Modification on local flora and fauna are detailed in the report and include siting of the Modification within a low impact area, staff training, erosion and sediment controls, weed control measures, and management and removal of waste related to the Modification.

Credit calculations and offsetting

A total of 10 ecosystem credits (PCT 155) and 11 species credits (Australian Bustard) are required to offset impacts to native vegetation and fauna habitat as a result of the Modification.

Glossary and list of abbreviations

Term or abbreviation	Definition
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Credit Calculator
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
cm	Centimetre/s
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	NSW Department of Planning, Industry and Environment (formerly DECCW, DECC, DEC, OEH)
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	Hectare/s
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometre/s
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The study area and surrounds, nominally a 30 km radius from the study area
m	Metre/s
MNES	Matters of National Environmental Significance (from the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>).
PCT	Plant Community Type
RDP	Rapid Data Point
SAIL	Serious and Irreversible Impacts
TEC	Threatened Ecological Community
VI	Vegetation Integrity as calculated by the BAM-C

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1. Introduction

1.1 Context

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by AECOM Australia Pty Ltd (AECOM) in November 2020 to assess the ecological values and impacts associated with the Broken Hill Battery Energy Storage System (BESS) (the approved Project) and prepare a Biodiversity Development Assessment Report (BDAR) as part of the Environmental Impact Statement (EIS). AGL Macquarie Pty Ltd (AGLM) commissioned AECOM to prepare the EIS. The approved Project was assessed and approved as State-significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (SSD-11437498). The approved Project included the connection of the BESS to the nearby Transgrid substation via a 22 kV overhead powerline into a 22 kV busbar at the substation.

Following approval of the Project, Transgrid requested AGLM modify the connection location at their substation. The new point of connection is located further north-west of the connection point of the approved Project. As a result, the proposed connection route from the BESS will now have to cross the alignment of existing overhead lines that extend from Transgrid's substation. In order to minimise conflicts with the existing overhead lines, the new connection route may need to be constructed underground (in part or in full). AGLM is therefore seeking to modify SSD-11437498 to allow for the option of installing the 22 kV transmission connection belowground (in part or in full) along a revised alignment between the BESS and the existing TransGrid substation.

As such, AECOM has commissioned Niche to modify the BDAR to reflect the proposed changes to the approved Project (the Modification). The primary objective of this BDAR is to use the Biodiversity Assessment Methodology (BAM) (Department of Planning, Industry and Environment [DPIE] 2020a) to describe and assess the ecological values within the Modification Area and surrounds, determine whether the Modification is likely to have an impact on threatened biodiversity listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and identify and quantify any associated biodiversity offsetting requirements.

It is noted that a preliminary biodiversity assessment for the approved Project was prepared by Niche in December 2019 (Niche 2019) to assess the biodiversity constraints associated with three different siting options, and to allow AGLM to make an informed decision based on those constraints.

1.2 The Approved Project

The approved Project is located on the outskirts of Broken Hill in the immediate vicinity of the existing Transgrid Broken Hill Substation. The approved Project Area consists of Lots 57 and 58 of DP285288 for the BESS (located at 74 to 80 Pinnacles Place, Broken Hill 2880, hereafter referred to as 'the Site'), as well as a transmission line corridor crossing Lot 7302 DP1181129 and Lot 2 DP1102040. The Transgrid Broken Hill substation is located at 76 Pinnacles Road, Broken Hill NSW 2880 on Lot 2 of DP 1102040.

The location of the approved Project Area consists of the locations identified in Table 1 and is shown in Figure 1. The approved Project Area consists of the Site, and the transmission line corridor (with an approximate 10 m buffer on either side) as identified in Figure 1.

Table 1: Subject land address and lot details

Project Area	Lot/DP	Address
The Site	Lots 57 and 58/DP285288	74-80 Pinnacles Place, Broken Hill
Transmission line corridor	Part Lot 2/DP1102040 Part Lot 7302/DP1181129	76 Pinnacles Road, Broken Hill

The approved Project comprises a BESS with a capacity of approximately 50 MW and up to 100 MWh. Key features of the approved Project include:

- Construction and operation of a BESS; and
- Connection of the BESS facility to the nearby Transgrid substation via a 22 kV powerline connecting through a 22 kV busbar at the substation.

The approved Project would be generally comprised of the following components:

- Battery enclosures
- Inverters
- Medium voltage transformers up to 22 kV
- Cabling and collector units
- Two x 3-phase cables encased by conduit or concrete
- Control and office building, workshop and equipment storage area
- 22 kV electrical switchyard
- Security fencing and lighting
- Access, internal roads and car parking
- Drainage and stormwater management
- Transmission connection infrastructure
- Minor works to connect the BESS to transformer compound or Transgrid switchyard
- Temporary site office/s, laydown and construction compound
- Other ancillary infrastructure.

It is currently anticipated that construction of the approved Project would take up to 12 months.

Construction works would likely comprise:

- Site preparation activities including:
 - Enabling works and prefabrication
 - Site clearance activities
 - Installation of erosion and sediment controls and site fencing
 - Provision of construction power
 - Minor earthworks to form a level BESS pad, switchyard area and construction laydown areas, including potential import or export of fill as required
 - Excavation, cable laying, backfilling and rehabilitation works between the approved BESS and existing substation using a rubber tracked mini excavator
 - Development of site access.
- Structural, civil, mechanical and electrical works
 - Connections to surrounding utilities, as required
 - Structural works to support BESS facilities
 - Construction of supporting structures, e.g. office building, workshop, and transmission line landing gantry

- Delivery, installation and electrical fit-out of BESS
- Construction of transmission connection between the Site and the Transgrid Broken Hill substation including excavation, cable laying, backfilling and rehabilitation works, and works associated with the connection on site and at the 22 kV busbar at the substation
- Transportation of plant, equipment, materials and workforce to and from the Site, as required.
- Commissioning
 - Testing and commissioning activities.
- Finishes and demobilisation
 - Provision of landscaping, as required
 - Removal of construction equipment and rehabilitation of construction areas.

A construction laydown area would also be provided on the Site. Minor earthworks would be required across this Site, including levelling it to ensure a suitable development footprint and establishment of site access. Excavations within the Site are expected to be a maximum depth of 3 m, while excavations for the transmission realignment would be around 1.2 m deep and a maximum of 1 m wide.

During operation, the Project is anticipated to run 24 hours a day, 7 days a week.

1.3 Modification

The Modification may involve a change in the proposed construction methodology for the transmission line connection as well as a revised transmission line alignment. The realignment of the transmission line means that it would now run parallel to, and south of, the approved overhead transmission line. The Modification would also provide the option of burying the proposed transmission line underground (possibly through open trenching through the drainage line) in comparison to being overhead as previously proposed. As a result, a larger area of vegetation (in two condition states – low and moderate) and the ephemeral drainage channel would be impacted by the Modification than previously assessed and approved.

1.4 The Modification Area

The Modification Area (disturbance footprint) encompasses around 1.45 hectares (ha) of land zoned IN1 (General Industrial) under the Broken Hill Local Environmental Plan, 2013 (LEP). The actual Modification Area, which is the proposed transmission line corridor (the area that has changed from the approved Project), is 0.6 ha in size (Figure 1).

The Modification Area contains an ephemeral drainage line with associated vegetation and the existing Transgrid Broken Hill Substation. The land on and around the substation has been subject to extensive disturbance from recent vegetation clearing and use of areas for equipment storage. There is sparse cover of native flora species within highly disturbed areas, and a lack of larger woody vegetation¹ across the Modification Area. Lot 7302 includes the ephemeral drainage line and an unsealed vehicle track.

As shown on Figure 2, the Modification Area occurs within the:

- Broken Hill Complex Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion
- Barrier Range IBRA Sub-region
- Barrier Downs Mitchell Landscape.

A list of the digital files created for the BDAR are included in Annex 8.

¹ The lack of larger woody vegetation is to be taken as descriptive only, and is noted to be a result of the natural environment of the locality i.e. a naturally treeless area.

1.4.1 Disturbance footprint/direct impact area

Within the Project Area (which is around 2.5 ha), only 1.45 ha of land would comprise the disturbance footprint. This 1.45 ha includes the whole of the Site, as well as a 20 m corridor outside of the Site, to allow the potential undergrounding of the transmission line to the Transgrid Broken Hill Substation. Around 0.91 ha of the Modification Area (disturbance footprint) is comprised of native vegetation with the remaining area cleared or currently being used as a storage area.

The area of the disturbance footprint for the proposed transmission line would not require entire vegetation removal; however, a worst-case scenario considering full clearing of a 20 m wide corridor has been assessed.

Construction laydown areas and spoil mounds will be located within the disturbance footprint.

1.5 Approval and assessment process

The following legislation or planning instruments are relevant to the works associated with the Modification.

1.5.1 State approval and assessment process – application of the BAM

In accordance with section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act), an application for development consent under Division 4.7 of the EP&A Act to carry out SSD must be accompanied by a BDAR unless the Planning Agency and the Environment Agency heads determine that the proposed development (including modifications) is not likely to have any significant impact on biodiversity values. The Secretary's Environmental Assessment Regulations (SEARs) issued for the approved Project required the preparation of a BDAR in accordance with Section 4.12(8) of the EP&A Act and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Reg).

The Biodiversity Offsets Scheme (BOS) threshold is a test used to determine when it is necessary to apply the BAM to assess the impacts of a proposed development (including modifications). The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan [LEP]). The minimum lot size as specified in the *Broken Hill LEP 2013* for land within the Modification Area is 0.023 ha. The Modification exceeds the BOS threshold of 0.25 ha of native vegetation clearing, being the applicable threshold for a minimum lot size of less than 1 ha (DPIE 2020b). As such, the Modification requires use of the BOS and approval for offsetting as per the requirements of the BDAR and the BC Act.

The Modification triggers the BAM and as such this BDAR describes the biodiversity values present within the Modification Area and identifies impacts from the Modification on these values. This assessment has used the BAM Calculator (BAM-C) (version 1.4)².

1.5.2 Commonwealth approval and assessment process

Matters of National Environmental Significance (MNES) are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The BAM requires proponents to identify and assess the impacts on all nationally listed threatened species and threatened ecological communities that may be present on or near a development site. This BDAR has identified threatened biodiversity listed under the EPBC Act that may be potentially impacted by the Modification. This BDAR also includes an assessment of

² BAM-C# 00018659/BAAS18054/22/00033257 (Revision 0).

significance for a single MNES (Dusky Hopping-mouse [*Notomys fuscus*] – listed as vulnerable under the EPBC Act) identified as having the potential to be affected by the Modification (Annex 6).

Under the EPBC Act, activities that have potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment for assessment. An EPBC Act referral was submitted to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) in March 2021 for the approved Project. The decision provided by DAWE is that the approved Project is not a controlled action, meaning no further assessment and approval under the EPBC Act is required before it proceeds (Annex 7). It is noted that the Referral, which incorporated above ground and underground transmission lines in its assessment, includes the Modification Area. The Modification Area does not support any TECs or important habitats for threatened flora, migratory species or any other MNES. The small loss of potential Dusky Hopping-mouse habitat is not likely to cause any significant impacts to this species, given the limited records of this species in bluebush shrubland, and the degraded state of the Modification Area. The Modification is unlikely to cause any significant impacts on MNES and is not a controlled action.

1.5.3 NSW Biosecurity Act 2015

The broad objectives for biosecurity in NSW under the NSW *Biosecurity Act 2015* are to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants by:

- Preventing their entry into NSW
- Quickly finding, containing and eradicating any new entries
- Effectively minimising the impacts of those pests, diseases, weeds and contaminants that cannot be eradicated through robust management arrangements.

Under the Department of Primary Industries' WeedWise database, priority weeds are defined by the following categories:

- Weeds of National Significance
- National environmental Alert List Weeds
- Water weeds
- Native plants considered weeds.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Weeds identified in the Study Area have been discussed in section 3.1.4.

1.5.4 Broken Hill Local Environmental Plan 2013

Local Environmental Plans (LEPs) are managed by Local Council's in consultation with their community and guide planning decisions for Local Government Areas (LGAs). They apply either to the whole or part of an LGA and make provision for the protection or utilisation of the environment through zoning of land and development controls.

The Modification Area is subject to the Broken Hill LEP 2013 and is zoned IN1 (General Industrial), under which development is permitted, with consent from Council. As the Modification relates to an approved SSD it will not be assessed by Broken Hill Council (Council). Instead, the Modification will be determined by the NSW Minister for Planning and Public Spaces (or delegate).

1.6 Assessment objectives and format

The primary objective of this BDAR is to use the guidelines and methodology provided in the BAM to determine the impact the Modification would have on biodiversity, avoid and mitigate these impacts and then calculate the Project’s biodiversity offset requirement.

This BDAR has been prepared in two broad stages consistent with the BAM methodology:

Stage 1 – Biodiversity Assessment

- assessment of landscape features
- assessment of native vegetation
- assessment of threatened species and populations.

Stage 2 – Impact Assessment

- avoid and minimise impacts on biodiversity values
- consider impact and offset thresholds
- determine and calculate offset requirements.

1.7 Assessment resources and assessor qualifications

This BDAR has been prepared by the accredited personnel and support staff identified in Table 2. Resources and survey guidelines used in the development of this BDAR are detailed in Table 3.

Table 2: Assessor qualifications and resources

Personnel	Qualifications	Tasks carried out
Simon Tweed	Senior Ecologist Accredited Biodiversity Assessor (BAAS 18088)	Review of credit calculations, peer review and quality assurance
Patrick McEvoy	Ecologist Accredited Biodiversity Assessor (BAAS 20018)	BAM plots and targeted threatened flora searches, data management, data entry
Stephen Bloomfield	Ecologist Accredited Biodiversity Assessor (BAAS 18054)	Updating of BDAR modification and credit calculations
Radika Michniewicz	Senior Ecologist	Threatened flora survey
Kurtis Lindsay	Principal Ecologist	Threatened flora survey
Freya Gordon	Senior Ecologist	Report preparation
Greg Tobin Yin Hua	GIS Specialists	Mapping

Table 3: Assessment resources and guidelines used

Assessment resources/guideline	
Resources	<ul style="list-style-type: none"> • Biodiversity Assessment Method (BAM) (DPIE 2020a) • BAM Operational Manual – Stage 1 (OEH 2018) • BAM Operational Manual – Stage 2 (DPIE 2019a) • BAM-C User Guide (OEH 2018)
Survey guidelines	<p>NSW</p> <ul style="list-style-type: none"> • Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c) • 2004 Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DECC 2004) <p>Commonwealth</p> <ul style="list-style-type: none"> • Survey Guidelines for Australia’s Threatened Birds (DEWHA 2010) • Survey Guidelines for Australia’s Threatened Reptiles (DSEWPaC 2011)

2. Landscape Assessment

2.1 Landscape assessment - methods

As detailed in section 3 of the BAM (DPIE 2020a), a landscape assessment for the Modification is required, which was conducted within ArcGIS and implemented within the BAM-C. Landscape value is an assessment of a number of factors, including:

- Native vegetation cover
- Rivers, streams and estuaries
- Areas of geological significance
- Habitat connectivity.

For each factor the current state of the landscape is assessed then compared with the state of the landscape if the Modification were to proceed.

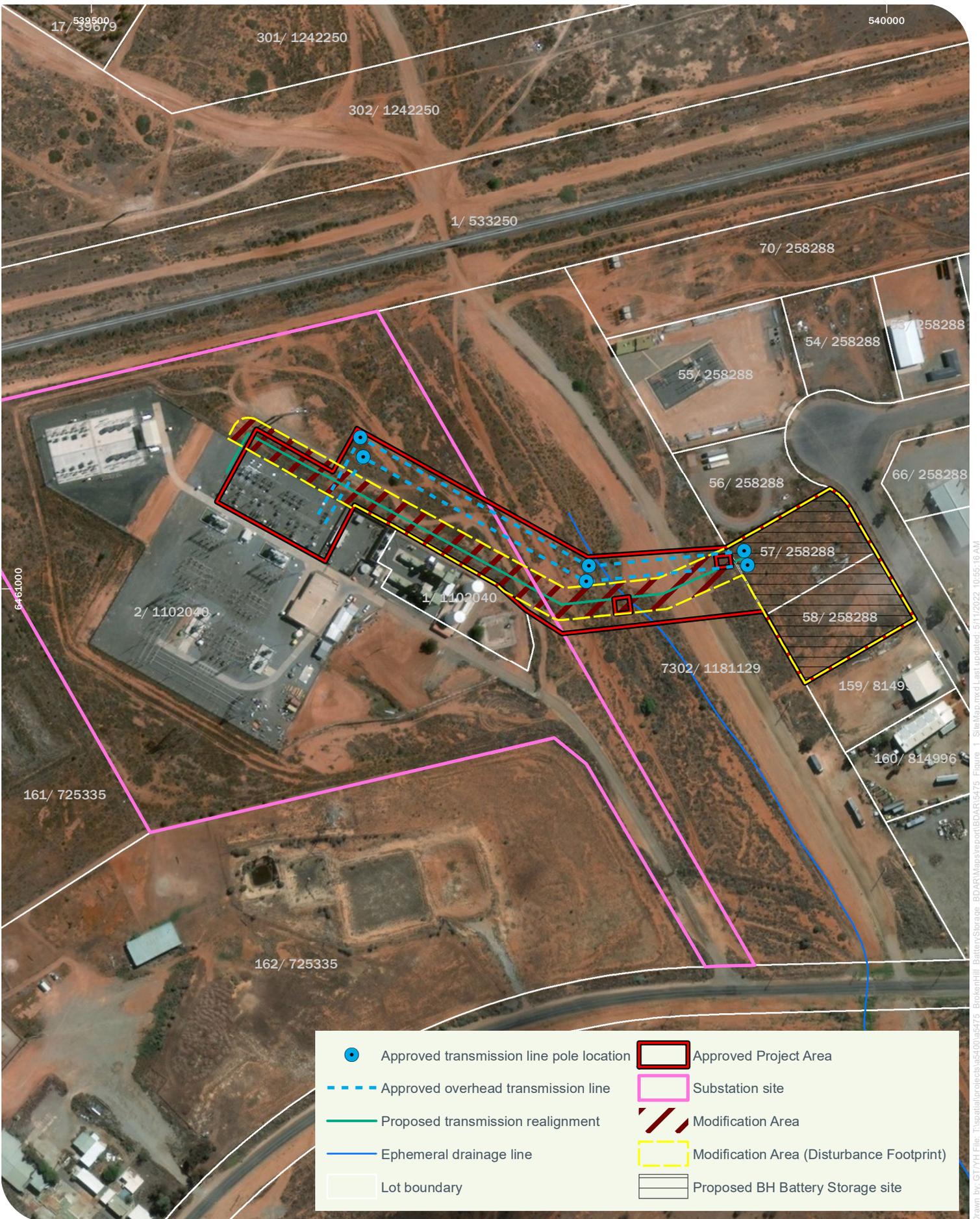
2.1.1 Landscape features and scoring

Table 4 provides details of the landscape settings and scored landscape features for the Modification.

Table 4: Landscape features and scoring under the NSW BAM

Landscape features	Description	Figure reference
Modification Area size	0.6 ha	Figure 1
Project Area	2.5 ha	Figure 1
Modification Area (disturbance footprint)	1.45 ha	Figure 1
Interim Biogeographic Regionalisation for Australia (IBRA) bioregion/subregion	The Modification is located within the Barrier Range IBRA Sub-region which is within the Broken Hill Complex IBRA bioregion.	Figure 2
NSW (Mitchell) Landscapes	The Modification Area is mapped as occurring within the Barrier Downs Landscape.	Figure 2
Rivers, streams and estuaries and Strahler stream order	There are no rivers or estuaries in close proximity to the Modification Area. There is an unnamed ephemeral drainage line that crosses the transmission line easement in Lot 7302. This is classified as a 1 st order stream; however, no water was present during the surveys.	Figure 2
Wetlands within and adjacent to development	There are no wetlands in close proximity to the study area.	Figure 2
Connectivity features	Connectivity occurs between the Modification Area and large tracts of shrubland vegetation to the north and south. This connectivity is disturbed as a result of the presence of roads on all sides, a railway track to the north of, and industrial infrastructure in neighbouring properties of the Modification Area.	Figure 1 and Figure 2

Landscape features	Description	Figure reference
Buffer area (percent native vegetation cover)	<p>A 1,500 m buffer was applied to the Modification Area resulting in an overall buffer area of 1,056 ha. Existing vegetation mapping (OEH 2016) is quite coarse and identified large areas of vegetation within the buffer area.</p> <p>Native vegetation cover</p> <p>The native vegetation extent and cover of woody vegetation was determined via aerial photography interpretation based on canopy cover, local vegetation mapping (OEH 2016) and knowledge of the Modification Area.</p> <p>For woody vegetation 95 per cent of the buffer area was determined to support native woody vegetation with benchmark cover (999.51 ha).</p> <p>For non-woody vegetation (grassland) 4 per cent of the buffer area was determined to support native grassland with benchmark cover (42.55 ha).</p> <p>Total native vegetation cover</p> <p>Combining the estimated woody and non-woody vegetation cover resulted in 99 per cent of the buffer area supporting native vegetation. This is an overestimation given the coarse vegetation mapping available; however, it has been adopted as a precautionary approach. The total native vegetation cover falls within the >70 percent category within the BAM-C.</p>	Figure 2
Site context	Site-based assessment	-
Geological significance and soils	<p>There are no karst, caves, crevices, cliffs or other areas of geological significance within the Modification Area.</p> <p>With reference to the descriptions provided in DECC (2002), the Barrier Range NSW (Mitchell Landscape) is characterised by the following soils: lithosols or shallow calcareous sandy loams on ridges, contour banded slopes of alternating stony red desert loams and stone-free red clays or solonized brown soils on long slopes. Dunes of deep clayey sand. Stony reddish-brown calcareous sandy loams, along drainage tracts, alluvial flats with brown self-mulching cracking clays. DPIE (2021a) identifies the soils of the Modification Area as desert loams.</p> <p>There are no high hazard soil areas.</p>	-



	Approved transmission line pole location		Approved Project Area
	Approved overhead transmission line		Substation site
	Proposed transmission realignment		Modification Area
	Ephemeral drainage line		Modification Area (Disturbance Footprint)
	Lot boundary		Proposed BH Battery Storage site



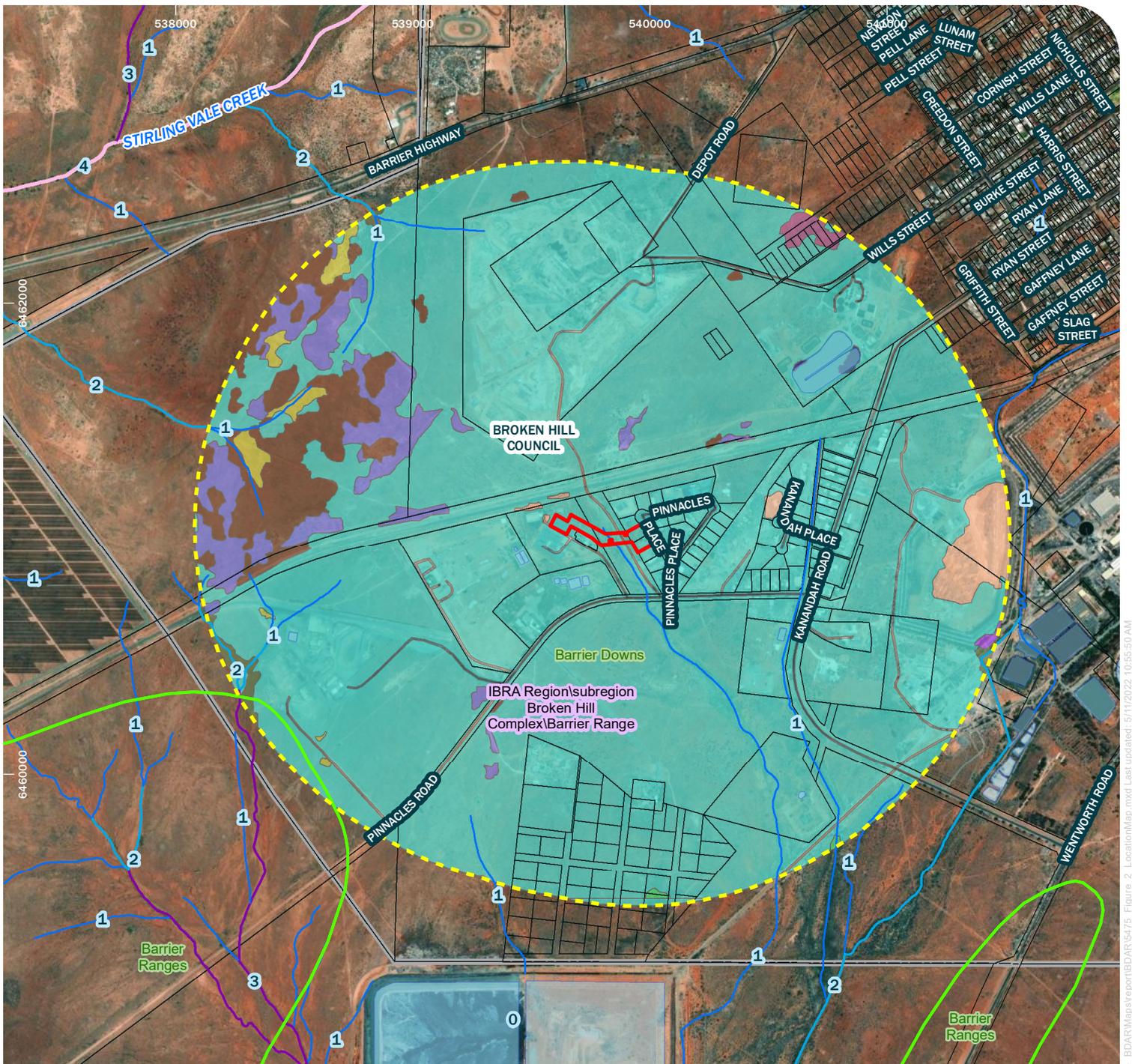
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 Client: AECOM

Site Map
Broken Hill Battery Storage BDAR

Figure 1

World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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3. Native vegetation and flora assessment

3.1 Methods - assessment of threatened species and populations

3.1.1 Data review

A review of relevant literature, databases and existing vegetation mapping was undertaken to identify likely vegetation communities and threatened biodiversity with the potential to occur in the Modification Area. This information was reviewed prior to field surveys being undertaken to inform initial survey effort and design and identify species for consideration.

Database searches within the locality (a 30 km radius around the Modification Area) were conducted prior to the site visit in December 2019, and updated in December 2021, to identify threatened biodiversity and migratory species with known occurrences or with the potential to occur in the Modification Area. A likelihood of occurrence analysis (Annex 5) was then undertaken prior to field surveys for each species/TEC, based on preliminary information regarding habitat present within the Modification Area. The following resources were used for this purpose:

- Database searches:
 - *NSW BioNet Atlas Database* (DPIE 2021b) for spatial records of threatened flora listed under the BC Act within a 30 km radius of the Modification Area (accessed December 2021).
 - *EPBC Act Protected Matters Search Tool* (PMST) (DAWE 2021) for fauna, flora and ecological communities identified as MNES known from or with potential habitat within a 30 km radius of the Modification Area (accessed December 2021).
 - BAM-C tool (using benchmark condition for previously mapped Plant Community Types, PCTs) to identify candidate species credit species and predicted ecosystem credit species known or predicated to occur within the IBRA subregion (accessed December 2021).
- Vegetation mapping: existing vegetation mapping (State Vegetation Type Map: Western Region v1.0. VIS_ID 4492) (DPIE 2019c) was examined prior to the field survey (refer to section 3.1.2) to determine the vegetation communities likely to be present in the approved Project Area.

Five categories for likelihood of occurrence were attributed to threatened biodiversity after considering the number and proximity of known records, presence or absence of preferred habitat types (e.g. native vegetation types and microhabitats) and professional judgement. The categories are outlined in Table 5. Species considered further for impact assessment included:

- Those in the 'Known', 'High' or 'Moderate' categories and where impacts for the species could reasonably occur from the Modification
- Candidate species as identified by the BAM-C.

Species listed with a 'Low' or 'None' likelihood of occurrence are those for which there is limited, or no habitat present within the Modification Area.

The likelihood of occurrence analysis (Annex 5) was updated for each species following the on-site habitat assessment based on final PCT and habitat assessment or targeted survey. Threatened flora species identified as candidate species in the BAM-C and those considered likely to occur and be impacted by the Modification are listed in Table 6. Their survey requirements, as detailed in Table 6, were used to inform targeted surveys as per Stage 1 of the BAM. It is noted that the likelihood of occurrence process does not and has not removed the need to follow the BAM requirements for the removal of species credit or ecosystem credit species within this BDAR.

Table 5: Likelihood of occurrence criteria

Likelihood rating	Threatened flora criteria	Threatened and migratory fauna criteria
Known	The species was observed within the Modification Area.	The species was observed within the Modification Area.
High	It is likely that a species inhabits or utilises habitat within the Modification Area.	It is likely that a species inhabits or utilises habitat within the Modification Area.
Moderate	Potential habitat for a species occurs within the Modification Area. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the Modification Area.	Potential habitat for a species occurs within the study area and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the Modification Area.
Low	It is unlikely that the species inhabits the Modification Area.	It is unlikely that the species inhabits the Modification Area. If present within the Modification Area, the species would likely be a transient visitor. The study area contains only very common habitat for this species which the species would not rely on for its ongoing local existence.
None	The habitat within the Modification Area is unsuitable for the species.	The habitat within the Modification Area is unsuitable for the species.

3.1.1.1 Threatened flora requiring survey

A total of four threatened flora species were identified by the BAM-C as species credit species and/or having a moderate to high likelihood of occurring in the Modification Area (Table 6 and Annex 5). There were an additional two species identified in the EPBC Act PMST search as having a moderate likelihood of occurrence (Annex 5). Of the candidate species identified, two are species subject to serious and irreversible impacts (SAIL) (Table 6). Table 6 includes habitat constraints and survey timing (as identified in the Threatened Biodiversity Data Collection [TBDC]) for each species and identifies whether targeted surveys were required/undertaken and where species were assumed present. Where species presence could not be ruled out based on lack of associated PCTs or quality of habitat, a conservative approach was taken, and targeted surveys conducted.

Table 6: Candidate and other threatened flora species with the potential to occur and requirement for survey

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAIL?	Habitat constraint (BAM)	Survey timing/effort	Inclusion in assessment based on?	Targeted survey undertaken?
Candidate species								
<i>Acacia notabilis</i>	Mallee Golden Wattle	E	-	No	None identified in BAM-C	Year-round.	BAM-C Candidate species	Yes Associated PCTs present in relevant IBRA subregion Initial survey carried out in required season. Conspicuous. Not detected.
<i>Swainsona flavicarinata</i>	Yellow-Keel Swainsona	E	-	Yes (Principle 3)	None identified in BAM-C	June-October. Survey 4 to 7 weeks after above average rainfall to detect flowering. Erratic occurrence, dying back under dry conditions.	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out in required season and after appropriate recent rainfall. Not detected.
<i>Swainsona viridis</i>	Creeping Darling Pea	E	-	Yes (Principal 3)	None identified in BAM-C	September-October. Survey after average to wet seasonal conditions. Flowers mainly in September to October but will sporadically flower earlier or later with above average rainfall. Above ground components are not detectable in dry conditions.	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out in required season. Not detected.
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	No	None identified in BAM-C	September. A survey was conducted in October 2020 to determine the presence of <i>Swainsona murrayana</i> (Slender Darling-pea) within the Project Area. A single survey month for the species is provided within the BAM-C (September). However, this does not appear to reflect the species profile, which states that plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. A review of current information in NSW for this species (NSW Scientific Committee 2008) states that the flowering period of <i>Swainsona murrayana</i>	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out. Not detected.

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAI?	Habitat constraint (BAM)	Survey timing/effort	Inclusion in assessment based on?	Targeted survey undertaken?
						is from August to November. Furthermore, this document contains location and record data, with 13 sites detecting the species in October (between 1956 and 2001). One of these sites recorded 3,000 plants in October 2000.		
Total number of species	4	-	-	2 candidate SAI	-	-	-	-

NSW and Commonwealth Status: E = Endangered, V = Vulnerable.

3.1.2 Methods – field survey

Field surveys were undertaken on two occasions and included the following:

1. BAM plots, vegetation mapping, incidental threatened flora survey and habitat assessment (as part of the constraints assessment) – 10 and 11 December 2019.
2. Targeted threatened flora survey and further habitat assessment – 29 October 2020.

Plot/transect surveys and targeted threatened species surveys were conducted throughout the Modification Area and immediate surrounds (see Figure 3) with results used within the BAM-C to generate credit requirements. The PCT within the Modification Area was recorded and mapped using a combination of vegetation quadrats, transects and walking meanders. Surveys were conducted both within and outside of the Modification Area, as the project design location was not finalised until after the surveys. Vegetation mapped as occurring within the Modification Area and flora survey effort is shown on Figure 3. Table 7 lists the PCT present, including its differing condition states, vegetation formation, class, and status. Alignment of the vegetation community to a PCT is discussed in Annex 1.

The following survey tasks were completed for the flora survey:

- Plant community delineation and mapping, using a combination of floristic assessments within BAM plots (four plots as per the BAM requirements) and one Rapid Data Point along walking meanders.
- Targeted flora surveys, including four person hours by two ecologists (29 October 2020).
- Opportunistic observations of flora and fauna, Threatened Ecological Communities (TECs), habitat quality and high threat and priority weeds.

3.1.2.1 BAM plots

The BAM plot requirement was determined using the BAM (DPIE 2020a) and was based on the area of each PCT condition type to be impacted.

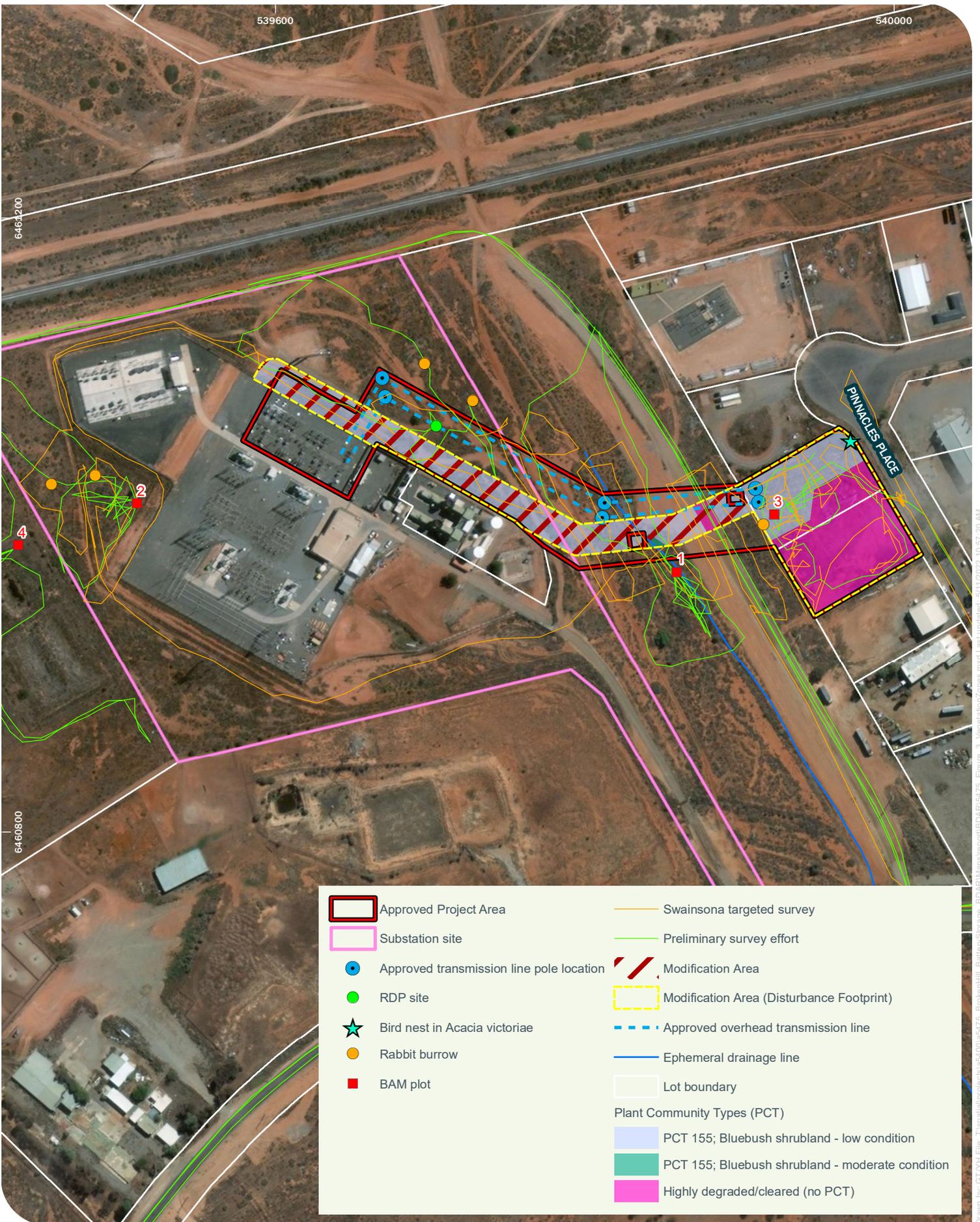
The number of plots conducted for each PCT and vegetation zone is provided in Table 7 and the location of the completed plots is shown on Figure 3. A total of four plots were undertaken during surveys for the preliminary biodiversity assessment (Niche 2019), before the exact Modification Area footprint was confirmed. Data from two of these plots (plot 1 [transmission easement] and plot 3 [BESS footprint]) were added to the BAM-C as these were considered the most representative of the two vegetation zones impacted by vegetation clearing. Plot 3 is also considered to be located conservatively as it was positioned within an area that allowed for the full length of the plot to be accommodated without cleared tracks intervening.

Details regarding PCT delineation and mapping are provided in Section 3.1.3. A detailed vegetation community description, including species used to aid in determining the PCT and justification for alignment to the nominated PCT are provided in Annex 1.

3.1.2.2 Threatened flora survey effort

Targeted threatened flora surveys were undertaken within areas of suitable habitat for four threatened flora species, as shown in Table 8.

Surveys were undertaken according to relevant survey guidelines (DPIE 2020c), with survey effort shown in Figure 3.



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Vegetation zones and plot locations
Broken Hill Battery Storage BDAR

Niche PM: Stephen Bloomfield
Niche Proj. #: 5475
Client: AECOM

Figure 3

World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Table 7: Plant Community Types and vegetation zones present across the Modification Area

PCT ID	PCT name	Condition	Vegetation Zone	BAM-C ID#	TEC status per BioNet Vegetation Classification (BC Act/EPBC act)	Vegetation Formation (Keith 2004)	Vegetation Class (Keith 2004)	PCT % cleared	Area to be cleared /impacted for development (ha)	BAM Plots required for the impact area	BAM Plots completed
155	<i>Bluebush shrubland on stony rises and downs in the arid and semi-arid zones</i>	Low	PCT 155_Low	1	Not listed	Arid Shrublands (Chenopod sub-formation)	Gibber Chenopod Shrublands	50	0.9	1	1
		Moderate	PCT 155_Moderate	2					0.01	1	1

Table 8: Survey effort (flora and vegetation)

Field survey activity	Method	Effort/timing
Plant community delineation and mapping	4 BAM plots (BCD 2020) and 1 RDP Transects and walking meanders to record boundaries between vegetation zones Habitat quality High threat and priority weeds	10 & 11 December 2019
Threatened flora surveys	As above. Random meander plus additional targeted survey (parallel transects) during relevant flowering periods for the following potentially occurring threatened flora: <ul style="list-style-type: none"> • Mallee Golden Wattle (<i>Acacia notabilis</i>) • Yellow-keeled Swainsona (<i>Swainsona flavicarinata</i>) • Creeping Darling Pea (<i>Swainsona viridis</i>) • Slender Daring Pea (<i>Swainsona murrayana</i>) 	10 & 11 December 2019 29 October 2020

3.1.3 Site values

Flora

A total of 37 flora species were recorded across the four plots; including 26 native species and 11 exotic species. Floristic plot data, including cover and abundance of all species recorded, is provided in Annex 2.

Plot and transect values

Results of the floristic composition, structure and function data obtained during the field assessment are provided in Annex 3.

Site value scores

The site value assessment was carried out by entering plot data into the BAM-C. The data provides quantitative measures of composition, structure and function for each vegetation zone (Annex 3). The BAM-C compares the values recorded with the benchmark for the vegetation class to provide the site value score. This score represents the overall condition of the vegetation compared to the benchmark value (out of 100).

The score from these inputs, coupled with data in the following section of this report, is used to determine the number of ecosystem credits that are required for development.

Patch size for all vegetation zones was given the highest score in the BAM (>100 ha), as the native vegetation in the Modification Area is directly connected to other large areas of native vegetation (as can be seen on Figure 1 and Figure 2).

The current and future vegetation integrity (VI) scores from the BAM-C is detailed in Table 9. The future integrity scores for the direct impact zones are reduced to zero as all vegetation, and habitats, within this zone are assumed to be removed. Post-construction, the transmission line corridor would be rehabilitated and the natural regeneration of vegetation permitted.

Table 9: Vegetation zones with current and future vegetation integrity scores

Vegetation zone	BAM Plot #	Area (ha)	Patch size	Current VI score	Future VI score	Change in VI score
PCT 155_Low	3	0.9	101	21.9	0	-21.9
PCT 155_Moderate	1	0.01	101	66.6	0	-66.6

3.1.4 High threat and priority weeds

During the field surveys two high threat weed (HTW) species were recorded: African Boxthorn (*Lycium ferocissimum*) (present in BAM plots 1 and 4) and *Prosopis velutina* (present in BAM plot 1). African Boxthorn is listed as a manageable HTW, which is capable of being effectively managed with specific management practices. Both species are listed as priority weeds for the western region of NSW.

3.1.5 Threatened ecological communities

PCT 155 does not qualify as a TEC under either the BC Act or the EPBC Act. The Modification would not impact on a TEC.

3.1.6 Threatened flora

As detailed in section 3.1.2, surveys for four threatened flora species predicted or considered to potentially occur were undertaken. All four species were identified as candidate species by the BAM-C, and none were identified as additional species from the EPBC Act PMST search as having a moderate likelihood of occurrence (Annex 6).

Of the candidate species identified, two are species identified as subject to SAI. Table 10 details the list of candidate and threatened flora species, including habitat constraints and survey timing (as identified in the TBDC). Table 10 lists those species for which surveys were undertaken.

None of the candidate flora species were recorded during targeted searches. Based on the results of the field survey and habitat assessment, candidate flora species are considered to be absent from the Modification Area as shown in Table 10.

Table 10: Candidate flora species and assessment of credit requirement

Common name	Scientific name	BC Act	EPBC Act	Subject to SAI?	Habitat constraint (BAM)	Survey timing/effort	Status
Candidate species (species credit species)							
Mallee Golden Wattle	<i>Acacia notabilis</i>	E	n/a	No	None identified in BAM-C	Year-round	Absent
Yellow-Keel Swainsona	<i>Swainsona flavicarinata</i>	E	-	Yes	None identified in BAM-C	June -October Survey 4 to 7 weeks after above average rainfall to detect flowering. Erratic occurrence, dying back under dry conditions	Absent
Creeping Darling Pea	<i>Swainsona viridis</i>	E	-	Yes	None identified in BAM-C	September -October Survey after average to wet seasonal conditions. Flowers mainly in September to October but will sporadically flower earlier or later with above average rainfall. Above ground components are not detectable in dry conditions.	Absent

Common name	Scientific name	BC Act	EPBC Act	Subject to SAII?	Habitat constraint (BAM)	Survey timing/effort	Status
Slender Darling Pea	<i>Swainsona murrayana</i>	V	V	No	None identified in BAM-C	<p>September. While the survey was conducted outside the month specified for this plant in the TBDC, it is known to flower from August to November (NSW Scientific Committee 2008); additionally its profile states it flowers from spring to early summer (DPIE 2021b). Furthermore, <i>Swainsona murrayana</i> has been detected from 13 sites in the month of October (between 1956 and 2001); one of these sites recorded 3000 plants (NSW Scientific Committee 2008). Evidence of dieback should have been detectable during targeted searches.</p> <p>It is also noted that the closest record of <i>Swainsona murrayana</i> is from Silverton (approximately 23 km to the north-west) from 1947.</p> <p>The approved conservation advice for the species states: Slender Darling-pea is found in grassland, herbland, and open Black-box woodland, often in depressions (DSE, 2001; Harden, 2002; DECC, 2005a). This species grows in heavy grey or brown clay, loam, or red cracking clays (DSE, 2001; DECC, 2005a). The Project Area does not conform well with this description given the lack of grassland, herbland or Black Box Woodland. The Project Area does not support heavy clay, loam or red cracking clays being predominantly shrubland on soils with a higher sand content.</p>	Absent

3.1.7 Threatened fungi

There were zero threatened fungi species identified by the BAM-C as species credit species and/or having a moderate to high likelihood of occurring in the impact area (Annex 5).

3.2 Fauna assessment

3.2.1 Methods - assessment of threatened species and populations

3.2.1.1 Data review

A review of relevant literature, databases and existing vegetation mapping was undertaken to identify fauna habitat and threatened fauna with the potential to occur within the Modification Area. The methodology is detailed in section 3.2.2. Results of the searches and reviews were undertaken prior to field survey to inform field survey requirements.

A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the Modification Area. This was updated within the current report (Annex 5) to reflect the suitability of habitat present within the Modification Area, as identified following the on-

site habitat assessment. Threatened species identified as subject species requiring further assessment included:

- Species with a moderate or higher likelihood of occurrence
- Candidate species as identified in the BAM-C.

Subject species requiring further assessment and/or survey are detailed in Table 11.

3.2.1.2 Threatened fauna requiring survey

Targeted threatened fauna surveys are required for those species identified as candidate species by the BAM-C once the BAM plot data were entered, unless their presence could be ruled out due to other factors such as absence of habitat, degraded habitat or vagrancy as per Section 5.2.3 of the BAM. Additionally, species identified as having a moderate to high likelihood of occurrence (based on presence of suitable habitat/required habitat constraints) (Annex 5) were considered for survey.

All ecosystem (predicted) credit species generated by the BAM-C were assumed present for the purposes of credit calculations; however, the likelihood of occurrence for each species is summarised in Annex 5. The ecosystem credit species are listed in Table 14.

A total of seven threatened fauna species were identified by the BAM-C as species credit species, and eight threatened fauna species were assessed as having a moderate likelihood of occurring in the Modification Area (Table 11 and Annex 5). This included one species identified in the EPBC Act PMST search as having a moderate likelihood of occurrence (Dusky Hopping-mouse). Of the candidate species identified, one species, Thick-billed Grasswren, is subject to SAIL.

The requirement for targeted survey for each of these species to determine presence/absence from the Modification Area (and the subsequent requirement for credits to be generated) was determined by consideration of the following:

- For each candidate species, review of PCTs associated with each species (as per the TBDC) and presence of those PCTs within each sub-region for which the species was identified as a candidate species
- Presence of habitat constraints (as identified in the TBDC) within the Modification Area
- Quality/suitability of habitat present as determined during the initial field survey
- Survey effort undertaken during the initial BAM site assessment/survey.

Species were excluded from candidacy in the BAM-C for the following reasons:

- Excluded from the entire relevant IBRA subregion due to absence of required habitat (habitat constraints) regardless of the presence of the species associated PCTs
- Excluded due to degraded habitat as per section 5.2.3 of the BAM
- Excluded as having been surveyed, based on the absence of large stick nests suitable for large raptors within the Modification Area, which indicates no suitable breeding habitat within the Modification Area.

Table 11 lists threatened fauna species identified as requiring further assessment including habitat constraints and survey timing (as identified in the TBDC) for each species and identifies whether targeted surveys were required/undertaken and where species were assumed present.

Table 11: Candidate (species credit) threatened fauna species with the potential to occur or requirement for survey

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAII?	Habitat constraint (BAM)	Survey timing/effort	Degraded habitat	Vagrant species	Reason for inclusion?	Survey undertaken and comments/justification	Presence
Candidate species											
<i>Amytornis modestus obscurior</i>	Thick-billed Grasswren (north-west NSW subspecies)	CE	CE	Yes	None identified in BAM-C.	Jul-Sep	Yes	Yes	BAM-C	<p>No</p> <p>The Modification Area (disturbance footprint) is mapped as an area where the species is predicted to occur (not known to occur) (DPIE 2022). The species is known from one population at Packsaddle approximately 175 km to the north of Broken Hill. The Modification Area (disturbance footprint) is considered outside of this species normal distribution. Therefore, the species is considered vagrant. It is very unlikely to be present within the study area. Opportunistic survey did not detect this species and in general bird survey data is relatively reliable in determining absence of species from parts of the state.</p> <p>The species usually inhabits dense, low saltbush, cottonbush, bluebush and nitre-bush areas on sandy plains or depressions in gibber; also occurs along watercourses in clumps of Canegrass. In NSW, preferred habitat appears to be shrubland dominated by Blackbush (<i>Maireana pyramidata</i>) that is higher and denser than surrounding areas. None of the above features are present within the Modification Area and shrub density is low.</p>	No
<i>Antaresia stimsoni</i>	Stimson's Python	V	n/a	No	Rocky areas within 500m of rocks or gibber	Sep-Mar			BAM-C	<p>No</p> <p>Limiting habitat not present</p>	No

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAI?	Habitat constraint (BAM)	Survey timing/effort	Degraded habitat	Vagrant species	Reason for inclusion?	Survey undertaken and comments/justification	Presence
<i>Ardeotis australis</i>	Australian Bustard	E	n/a	No	None identified in BAM-C	Year-round			BAM-C	Yes Habitat is unlikely to be core habitat but might be used from time to time.	Yes – habitat degraded, however, species is wide-ranging and unable to be excluded (see Section 3.2.4).
<i>Ctenophorus mirrityana</i>	Barrier Range Dragon	E	n/a	No	Rocky areas Requires rock crevices	Oct-Mar			BAM-C	No Limiting habitat not present	No
<i>Hieraaetus morphnoides</i>	Little Eagle	V	n/a	No	Nest trees - live (occasionally dead) large old trees within vegetation)	Aug-Oct			BAM-C	No Limiting habitat not present	No
<i>Lophocroa leadbeateri</i>	Major Mitchell's Cockatoo	V	n/a	No	Hollow bearing trees Living or dead tree with hollows greater than 10 cm diameter	Sep-Dec			BAM-C	No Limiting habitat not present	No
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	n/a	No	None identified in BAM-C	Oct-Mar	Yes	Not considered vagrant; however, lack of nearby records (or any in the subregion) (closest record is greater than 100 km).	BAM-C	No The Modification Area was deemed too degraded and unsuitable for this species due to: <ul style="list-style-type: none"> • presence of European Rabbits and likely presence of goats and foxes. • previous clearing and light to heavy vehicle movements evidenced by tracks, has caused a reduction in the density of shrubs and ground cover and soil compaction both of which are required to provide shelter habitat. A reduction in shrub and ground cover density which provides shelter habitat also increases the risk of predation from cats and foxes. 	No Aside from the degraded habitat identified there is a lack of stony areas with shrubs and limited records within the subregion.
Total number of species	7	-	-	1 x candidate SAI	-	-	-	-	-	-	-1 x candidate species

NSW and Commonwealth Status: E = Endangered, V = Vulnerable. n/a = not applicable. Likelihood rating: M = Moderate, H = High, K = Known.

3.2.2 Methods – field survey

Field surveys across the Modification Area included habitat assessment and opportunistic sightings of threatened fauna. This was undertaken during both survey periods (December 2019 and October 2020).

Key habitat features recorded, and used to determine the likely presence of threatened species, included:

- Type, condition and diversity of vegetation communities present
- Presence of roosting/breeding/shelter resources such as hollow-bearing trees, rock ledges/rocky outcrops/shelters/caves and logs/leaf litter.

Targeted threatened fauna survey was not undertaken as the survey effort was considered sufficient to accurately characterise the general quality of the available habitat and determine the likelihood of occurrence (Annex 5). The list of candidate fauna species and the requirement for survey is shown in Table 11. Of the seven candidate species generated by the BAM-C, only one (Australian Bustard) was found likely to occur on occasion. This has been further discussed in Section 3.2.4.

3.2.2.1 Habitat assessment

The key habitat features recorded were used to determine the likely presence of threatened species. These included:

- Type, condition and diversity of vegetation communities present
- Presence of roosting/breeding/shelter resources such as:
 - large stick nests suitable for raptors
 - hollow-bearing trees and stags
 - rock ledges, shelters, caves, outcrops, gibber plains
 - logs and leaf litter.

The fauna survey methods and effort consisted of the following tasks (Table 12, Figure 3):

- Opportunistic observations made throughout the survey team’s time on site, including tracks, scats and signs of evidence.

Table 12: Fauna survey effort

Survey technique	Date	Survey effort	Species targeted
Habitat survey	10-11 December 2019	6 person hours	Mapping of hollow-bearing trees and searching for the presence of nests, logs, outcrops and other important habitat features
Opportunistic survey	10-11 December 2019, 29 October 2020	6 person hours Conducted in conjunction with targeted flora surveys. 4 person hours	All threatened fauna species with a moderate to high likelihood of occurrence
	29 October 2020	4 person hours	All threatened fauna species with a moderate to high likelihood of occurrence

Weather conditions

Conditions were warm to hot on all survey days, with no rainfall (Table 13).

Table 13: Weather conditions during survey

Survey	Wind direction and max. speed (km/h)	Max. temperature (°C)	Rain (mm)	Relative humidity at 9am (%)
10 Dec 2019	SSW 43	33.6	0	34
11 Dec 2019	S 44	32.7	0	33
29 Oct 2020	WNW 65	26.6	0	38

Data from Broken Hill Airport (047048) BOM weather station, www.bom.gov.au.

3.2.3 Fauna and fauna habitats

No rocky areas or rock piles suitable for fauna habitat were observed within the Modification Area. Mature trees are absent from the Modification Area, with only two recorded outside the Modification Area boundary. Small shrubs and forbs provide some potential shelter habitat for small mammals and reptiles. Some disused rabbit burrows were identified both within the Modification Area and to the north and west of the Modification Area. The greater part of the Site is currently used for equipment and vehicle storage. While equipment and vehicle storage may provide limited shelter for a range of smaller terrestrial fauna species, the overall habitat quality is poor. One *Macropus robustus erubescens* (Euro) was observed and Euro scats were abundant. One nest was recorded in an *Acacia victoriae* shrub adjacent to Pinnacles Place. Bird species may utilise the Modification Area to forage, but overall there are very few resources within the Modification Area for roosting and nesting.

Fauna species recorded in the study area are listed in Annex 4. A total of four fauna species were recorded during field surveys, comprising two birds, one mammal, and one reptile (Annex 4).

3.2.4 Threatened fauna

As detailed in section 3.2.2, targeted surveys for threatened fauna species were not undertaken due to limited habitat availability. No threatened species were detected opportunistically during the surveys.

Based on the results of the BAM-C, field survey and habitat assessment, species were identified as present or absent from the Modification Area as shown in Table 14.

While opportunistic survey is inadequate for demonstrating presence or absence of species credit species, only one candidate species, Australian Bustard, was found likely to occur on occasion; and this species presence has been assumed.

One threatened fauna species listed in the EPBC Act has a moderate likelihood of occurrence in the Modification Area due to an association with PCT 155: Dusky Hopping-mouse (*Notomys fuscus*). An Assessment of Significance in accordance with the 'significant impact' criteria for Vulnerable Species under the EPBC Act was undertaken for the species and concluded that given the limited records of this species in bluebush shrubland, the degraded state of the Modification Area, and the absence of tracks or burrows, it is highly unlikely to occur within the Modification Area and be impacted by the Modification.

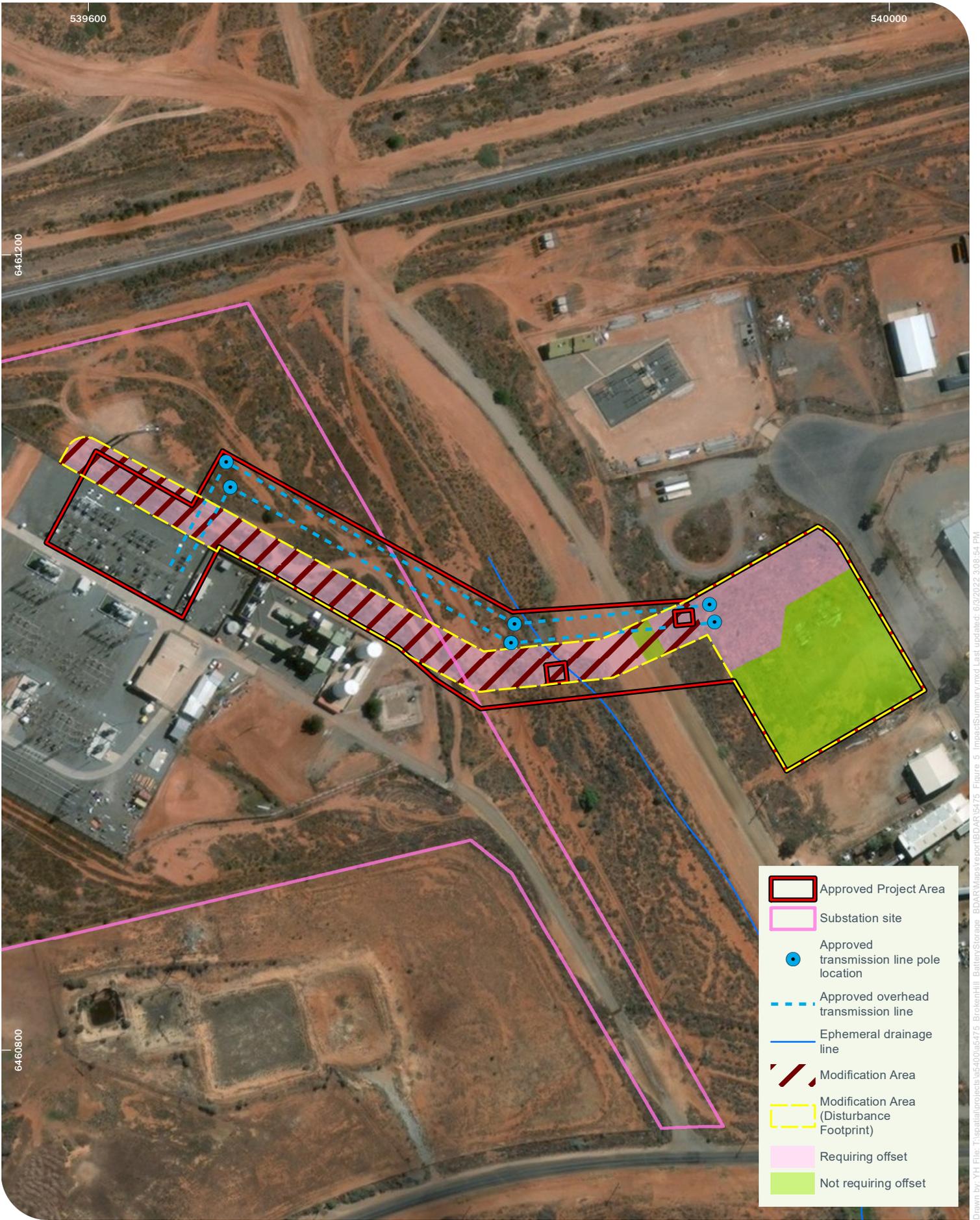
Species credits are required for those candidate species identified as present within the Modification Area (see Table 14). In order to determine the offset requirement, a species polygon (areas of occupied/potential habitat for the species) was developed for the Australian Bustard as described below.

Table 14: Candidate fauna species and assessment of credit requirement

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Bolam's Mouse	<i>Pseudomys bolami</i>	Yes – assumed present
Black Falcon	<i>Falco subniger</i>	Yes – assumed present
Dusky Hopping-mouse	<i>Notomys fuscus</i>	Yes – assumed present
Dusky Woodswallow	<i>Artamus cyanopterus</i>	Yes – assumed present
Flock Bronzewing	<i>Phaps histrionica</i>	Yes – assumed present
Forrest's Mouse	<i>Leggadina forresti</i>	Yes – assumed present
Grey Falcon	<i>Falco hypoleucos</i>	Yes – assumed present
Kultarr	<i>Antechinomys laniger</i>	Yes – assumed present
Little Eagle	<i>Hieraaetus morphnoides</i>	Yes – assumed present
Little Pied Bat	<i>Chalinobus picatus</i>	Yes – assumed present
Long-haired Rat	<i>Rattus villosissimus</i>	Yes – assumed present
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	Yes – assumed present
Pied Honeyeater	<i>Certhionyx variegatus</i>	Yes – assumed present
Redthroat	<i>Pyrrholaemus brunneus</i>	Yes – assumed present
Ringed Brown Snake	<i>Pseudonaja modesta</i>	Yes – assumed present
Rufous Fieldwren	<i>Calamanthus campestris</i>	Yes – assumed present
Sandy Inland Mouse	<i>Pseudomys hermannsburgensis</i>	Yes – assumed present
Spotted Harrier	<i>Circus assimilis</i>	Yes – assumed present
Stripe-faced Dunnart	<i>Sminthopsis macroura</i>	Yes – assumed present
Wedgesnout Ctenotus	<i>Ctenotus brooksi</i>	Yes – assumed present
White-fronted Chat	<i>Epthianura albifrons</i>	Yes – assumed present
Woma	<i>Aspidites ramsayi</i>	Yes – assumed present
Candidate species (species credit species)		
Australian Bustard	<i>Ardeotis australis</i>	Yes – assumed present on occasion
Thick-billed Grasswren (north-west NSW subspecies)	<i>Amytornis modestus obscurior</i>	No – closest population 175 km away. Habitat degraded.
Stimson's Python	<i>Antaresia stimsoni</i>	No – key habitat features absent
Barrier Range Dragon	<i>Ctenophorus mirrityana</i>	No – habitat absent
Major Mitchell's Cockatoo	<i>Lophocroa leadbeateri</i>	No – limiting habitat not present
Crowned Gecko	<i>Lucasium stenodactylum</i>	No – habitat degraded.
Little Eagle	<i>Hieraaetus morphnoides</i>	No – key habitat features absent
MNES		
Dusky Hopping-mouse	<i>Notomys fuscus</i>	Yes – assumed present

Species polygons

As required by step five of section 5.2 of the BAM, a species polygon was prepared which identifies the areas of the Modification Area that contain habitat suitable for each candidate species (Figure 4). The Australian Bustard is the only candidate species which has been assumed present. This species is mobile and wide-ranging and could not be eliminated due to absence of limiting habitat. The Australian Bustard has a biodiversity risk weighting of two (2) which was factored into credit calculations. The species polygon for the Australian Bustard comprises all of PCT 155 in the Modification Area, since the PCT is listed as associated habitat in the BioNet Threatened Species Database (DPIE 2020d).



Drawn by: YH File: T:\spatial\projects\as400\as475_BrokenHill_BatteryStorage_BDAR\Maps\report\BDAR\5475_Figure_5_ImpactSummary.mxd Last updated: 6/9/2022 3:06:54 PM

3.2.5 Connectivity

Mobile species such as Australian Bustard may move through the Modification Area on occasion. The placement of the BESS would not prevent habitat connectivity due to its location adjacent to an industrial area. Lot 7302 DP1181129 would provide habitat connectivity for species such as the Australian Bustard; however, post-construction, the Modification would not prevent movement of fauna through this area. The Modification is unlikely to alter fauna movements and there are many connectivity opportunities throughout the region.

4. Impact Assessment

The Impact Assessment forms Stage 2 of the BDAR as detailed in section 7 of the BAM.

4.1 Avoid and minimise impacts

In accordance with the BAM, proponents must demonstrate the measures employed to avoid, mitigate and offset impacts of a proposed development (including modifications) on biodiversity values. This section outlines the avoidance, management and mitigation measures that AGLM have incorporated into the Modification design or would employ during construction, operation or completion of the Modification to reduce impacts on biodiversity values.

A summary of the avoidance and mitigation measures including action, outcome, timing and responsibility are provided in Table 15.

4.1.1 Avoidance measures (pre-construction)

Three siting options were considered in 2019 by Niche as part of a Preliminary Biodiversity Assessment (2019) to identify key biodiversity values and constraints. The assessment concluded that all options offered limited important habitat for threatened flora and fauna and were variously disturbed. Native vegetation present comprised PCT 155 of which there was a single patch in moderate condition. The majority of this vegetation patch will be avoided in the chosen design.

4.1.2 Mitigation measures (construction and post construction)

Mitigation measures that would be implemented during the construction and operational phases of the Modification would be documented within an appropriate Construction Environmental Management Plan (CEMP). The objective of the CEMP would be on maintaining current site values in retained areas and preventing clearing that would increase threats to biodiversity in better-condition areas (e.g. prevent far-field movements of high-threat weeds).

The CEMP would include a Biodiversity Management Plan (BMP), which will be prepared in consultation with DPE / BCS prior to the commencement of construction works. The BMP and/or other parts of the CEMP would include delineation of the Modification Area to ensure there are no impacts outside of the Modification Area boundary and provide discussion on staff training, erosion and sediment controls, weed control measures, and management and removal of waste (see Table 15). Measures within the CEMP would include standard construction environmental management measures and, where performed by experienced practitioners, are considered to be reliable (low risk of failure). Given the existing environment, the consequence of impacts after mitigation measures have been carried out is considered low.

Regarding the weed management mitigation measures, Table 16 provides further guidance on the timing and performance criteria required. This information would be included in the Modification's BMP.

Table 15: Mitigation measures

Mitigation measure and timing	Responsibility	Timing
Pre-construction		
<i>Preparation of a Biodiversity Management Plan</i> – to include measures listed below.	Project manager	Plan to be developed and accepted prior to site clearing
<i>Delineation of the site</i> – establish exclusion zone around the Modification Area to ensure clearing does not occur outside those boundaries.	Project manager	Prior to clearing
<i>Staff training</i> – e.g. communicate the importance of exclusion zones, erosion and sediment controls, unexpected species finds procedure.	Project manager	Prior to clearing
<i>Weed Management Strategy</i> – designed to control prevalent weeds, particularly HTW, identified in the Modification Area and within a 20 m buffer area. This would include mapping the location of HTW (African Boxthorn and <i>Prosopis velutina</i>) at a minimum, as well as providing hygiene measures for all vehicles and plant during construction.	Project manager	Prior to clearing
Construction		
<i>Erosion and sediment controls</i> – Implementation of erosion and sediment controls for the duration of construction works (detailed in CEMP).	Project manager	Prior to clearing and maintained until affected areas return to their present state or better
<i>Hygiene protocols</i> - prevent the spread of weeds or pathogens between affected areas and unaffected areas.	Project manager	During construction
<i>Weed control</i> - measures would form part of operational maintenance to manage the potential dispersal and establishment of weeds during operation in accordance with the <i>Biosecurity Act 2015</i> . Such measures would include: <ul style="list-style-type: none"> physical or chemical removal (via the cut and paint method) of African Boxthorn and <i>Prosopis velutina</i> vehicle clean/wash prior to and before exiting the construction site. 	Project manager/ Weed contractor	Prior to and during construction
<i>Excavation through ephemeral stream</i> - open trenching to be undertaken during periods of no rainfall and water flow. Area to be backfilled (with excavated material from the trench) and rehabilitated immediately post-construction (as is reasonably practical) with plants endemic to the locality. Any fill material required for the site must be clean fill.	Project manager	During and immediately after construction
Operation		
All waste would be appropriately managed.	Project manager	During and immediately after construction

Mitigation measure and timing	Responsibility	Timing
Modification Area to be monitored for weed invasion and managed according to the Weed Management Strategy.	Project manager	During construction and quarterly inspections for the 12 months post-construction completion

Table 16: Performance and completion criteria for weed management

Action	Performance Criteria	Method	Completion Criteria
Control of HTW: African Boxthorn and <i>Prosopis velutina</i> , and any other weeds with high cover	Eradication of existing HTW. Infestation areas to be equal or less than the baseline dataset i.e. weed data recorded as part of the survey and mapping undertaken prior to commencement of works. Per cent cover of weed species in each vegetation zone equal to or less than baseline dataset. No new weed species or infestations.	Survey at existing infestation locations. For the purpose of obtaining native versus exotic species cover and abundance data, monitoring transects are to be conducted throughout the modification area and in randomly selected locations in adjacent native vegetation. Opportunistic observations by construction personnel.	Pre and during construction and quarterly inspections for the 12 months post-construction completion.

4.2 Impact summary

An assessment of the potential impact of the Modification on biodiversity is provided below. It considers direct and indirect impacts as defined in OEH (2018), which states:

“Direct impacts are those that directly affect habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development. When applying each factor, both long-term and short-term impacts are to be considered.

Indirect impacts occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.”

The Modification would affect biodiversity through both direct and indirect impacts, as shown in Figure 5 and discussed in Table 17 below.

A likelihood rating of Known, High, Moderate, Low or None has been assigned to each of the potential impacts listed in Table 17.

Table 17: Assessment of direct and indirect impacts as a result of the Modification

Impact	Extent of impact as a result of the Modification
Direct impacts	
Removal or modification of native vegetation	Known: approximately 0.3 ha of low condition native vegetation (PCT 155) would be removed from the Site. Another 0.6 ha of low condition native vegetation (PCT 155) and 0.01 moderate condition native vegetation (PCT 155) occurs along the transmission line corridor (20 m). This is a worst-case scenario and all vegetation within the corridor would not require removal. See Section 4.1.1 for avoidance measures.
Loss of individuals of a threatened species	Low: no threatened species were recorded, and due to the low condition habitat within the Modification Area, there is a low likelihood that any individuals would be impacted by the Modification.
Removal or modification of threatened species habitat other than native vegetation (micro-habitat features)	Low: the area to be impacted contains limited habitat features (e.g. coarse woody debris), which may be used by threatened species. The Modification would not limit foraging or breeding habitat for threatened species in the locality. Vagrant or wide-ranging species such as the Australian Bustard may occur on occasion.
Death through trampling or vehicle strike	Low: clearing is the main impact from the Modification, there would be limited increased risk from trampling or vehicle strike.
Death through poisoning	Low: no poisons are proposed to be used as part of the Modification. Harmful substances used in construction and during weed management (if required) would all be controlled in accordance with Australian Standards.
Fragmentation	Low: vegetation within the Modification Area is already fragmented by other land uses and informal tracks. Clearing proposed would marginally increase fragmentation impacts; however, only low condition vegetation would be impacted.
Indirect impacts	
Predation by domestic and/or feral animals	Low: the Modification is not likely to increase the presence of domestic or feral animals in the local area. Feral animals (e.g. rabbits) are already present.
Loss of shade/shelter	Known: the removal of 0.6 ha of native vegetation (worst-case scenario) in the Modification Area would result in a loss of a small portion of shade and shelter for local fauna. This impact is considered low considering there is similar habitat in the immediate vicinity that would not be impacted by the Modification.
Loss of individuals through starvation	Low: the habitat to be removed in the Modification Area is not considered likely to cause loss of individuals through starvation.
Loss of individuals through exposure	Low: habitat to be removed in the Modification Area occurs primarily as patchy stands of native groundcover and midstory vegetation. Areas of habitat nearby would not be impacted by the Modification. The Modification is not considered likely to cause a loss of individuals through exposure.

Impact	Extent of impact as a result of the Modification
Edge effects (noise, light, traffic)	Low: the Modification would introduce edge effects such as noise and traffic during construction. Post-construction, these impacts would be infrequent and relatively unchanged from present conditions.
Deleterious hydrological changes	None: the Modification would not alter existing flow regimes of any watercourses. While the trench for the cabling would be excavated through the watercourse, the watercourse is ephemeral in nature and would not result in any hydrological changes to it. The trench would be backfilled immediately and rehabilitated. Regardless of the option chosen, transmission line poles would not be erected within the riparian corridor (i.e. 10 m either side of the waterway).
Weed invasion	Low: weeds may be introduced or spread at the Modification Area if weed control protocols are not adhered to. This would be monitored and managed via weed control.
Increased human activity within or directly adjacent to sensitive habitat areas	Known: there are no sensitive habitat areas within the Modification Area, and human activity is unlikely to increase substantially post-construction.

4.2.1 Potential serious and irreversible impacts (SII)

The BC Act imposes various obligations on decision-makers in relation to impacts on biodiversity values that are at risk of SII. These obligations generally require a decision-maker to determine whether the residual impacts of a proposed development on biodiversity values (that is, the impacts that would remain after any proposed avoid or mitigate measures have been undertaken) are serious and irreversible (DPIE 2019b).

Three threatened species at risk of SII were considered to have the potential to occur within the Modification Area. Targeted surveys for two of these species (Yellow-Keeled Swainsona and Creeping Darling Pea) did not detect their presence. A third species, Thick-billed Grasswren, was not surveyed for as the species was not considered to occur (Table 11). As such, no threatened biodiversity at risk of SII are considered to be adversely impacted by the Modification.

5. Quantifying Offset Requirements

The BAM identifies the BAM-C as the appropriate tool for quantifying the offsets required in both ecosystem credit and species credit terms. A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the Modification has been undertaken using the BAM-C.

The case will be finalised and submitted via the online BAM-C post-finalisation of this BDAR. The date of submission of the BDAR must be within 14 days of the date shown on the relevant finalised credit report generated using the BAM-C.

As the Modification will not result in a significant impact on any threatened biodiversity listed under the EPBC Act, no threatened biodiversity are required to be offset.

An EPBC Act Referral has been prepared and submitted to DAWE as part of the approved Project. The decision provided by DAWE is that the approved Project is not a controlled action, meaning no further assessment and approval under the EPBC Act is required before it proceeds (Annex 7). It is noted that the Referral, which incorporated above ground and underground transmission lines in its assessment, includes the Modification Area.

5.1 Summary of ecosystem credits required

The results of the BAM-C ecosystem offset credit requirements, including current, future and change in vegetation integrity scores are shown in Table 18.

Impacts to native vegetation communities within the development site generate a requirement for 10 ecosystem credits. These 10 ecosystem credits also cover the credit requirement for ecosystem credit species. The full BAM-C biodiversity credit report is provided in Annex 8.

Table 18: Ecosystem credit requirement

PCT – vegetation zone	Impact area (ha)	Current Vegetation Integrity score	Future Vegetation Integrity score	Change in Vegetation Integrity Score	Biodiversity risk weighting	Required credits
155 - Low	0.9	21.9	0	-21.9	1.75	9
155 - Moderate	0.01	66.6	0	-66.6	1.75	1

Figure 5 identifies the impacts of the Modification and those areas requiring to be offset. In accordance with the BAM (DPIE 2020a), areas to be offset are PCTs with a Vegetation Integrity (VI) score:

- ≥ 15 where the PCT is an Endangered Ecological Community or Critically Endangered Ecological Community.
- ≥ 17 where the PCT is associated with threatened species habitat or is a Vulnerable Ecological Community.
- ≥ 20 where the PCT is not represented with a TEC or associated with threatened species habitat.

Areas not requiring to be offset include any other areas where the VI scores are less than those detailed above.

Figure 5. Impact summary

5.2 Summary of species credits required

The results of the BAM-C species offset credit requirements are shown in Table 19. Threatened species identified or assumed to be present within a development site and likely to be impacted by the Modification generate a requirement for a total of 11 species credits. The full BAM-C biodiversity credit report is provided in Annex 8.

Table 19: Species credits required

Threatened species	Habitat impacted (ha)	Required credits
Australian Bustard (<i>Ardeotis australis</i>)	0.91	11

6. Summary

Impacts of the Modification on ecological values are summarised as follows:

- Direct removal of 0.91 ha of native vegetation containing one non-threatened PCT in low and moderate condition
- Removal of 0.91 ha of fauna habitat (native vegetation) including potential low-quality habitat for threatened fauna
- Removal of 0.91 ha of flora habitat.

No flora listed under the BC Act or EPBC Act are considered affected species. One assessment of significance under the EPBC Act was required for threatened fauna (Dusky Hopping-mouse *Notomys fuscus*), which concluded a significant impact as a result of the Modification was unlikely. In response to the EPBC Act Referral regarding Commonwealth threatened species that was submitted as part of the approved Project, DAWE concluded that the approved Project was not a controlled action. The Referral is considered to include the Modification Area.

Environmental impacts have been avoided, minimised and mitigated through the design and siting of the Modification, as well as the proposed implementation of actions detailed in Section 4.1.

Biodiversity offsets required for unavoidable impacts of the Modification have been calculated as follows:

- Ecosystem credits: a total of 10 ecosystem credits for PCT 155. These ecosystem credits also cover the credit requirement for ecosystem credit species.
- Species credits: a total of 11 species credits for the Australian Bustard.

The total credit offset obligation for the Modification requires the retirement of 10 ecosystem credits and 11 species credits.

References

DAWE (2021a). Protected Matters Search Tool, Commonwealth Department of the Environment and Energy. <<https://www.environment.gov.au/epbc/protected-matters-search-tool>>

DECC (2002). Descriptions for NSW (Mitchell) Landscapes Version 2. Based on descriptions compiled by Dr. Peter Mitchell. NSW Department of Environment and Conservation, Sydney.

DECC (2004). Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. NSW Department of Environment and Conservation, Sydney.

DEWHA (2010). Survey guidelines for Australia's threatened birds, Department of Environment, Water Heritage and the Arts <<https://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds-april-2017.pdf>>

DoEE (2021). SPRAT Profiles (accessed January 2021), <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>, Commonwealth Department of the Environment and Energy. Provides access to threatened species profiles, recovery plans and final determinations by the Commonwealth Scientific Committee.

DPIE (2019a). Biodiversity Assessment Method (BAM) Operational Manual Stage 2. State of NSW and Department of Planning, Industry and Environment. Dated September 2019.

DPIE (2019b). Guidance to assist a decision-maker to determine a serious and irreversible impact, State of NSW and Department of Planning, Industry and Environment.

DPIE (2019c). State Vegetation Type Map: Western Region v1.0. VIS_ID 4492.

DPIE (2020a). Biodiversity Assessment Method. State of NSW and Department of Planning, Industry and Environment.

DPIE (2020b). Biodiversity Values Map and Threshold tool user guide. <<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-values-map-threshold-tool-user-guide-200578.pdf>>

DPIE (2020c). Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method. <<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf>>

DPIE (2020d). VIS Classification – Community Profile Reports. VIS Classification Version 3.2.4.

DPIE (2021a). Soil Group (GSG) Soil Type map of NSW - Version 4.5, Department of Planning, Industry and Environment, Parramatta.

DPIE (2021b). BioNet Threatened Species Database. <<http://www.bionet.nsw.gov.au/>>

DSEWPAC (2011). Survey guidelines for Australia's threatened reptiles. Australian Government, Department of Sustainability, Environment, Water, Population and Communities <<https://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelines-reptiles.pdf>>

Niche (2019) Broken Hill battery storage preliminary biodiversity assessment. Report prepared for AECOM by Niche Environment and Heritage, Parramatta, NSW.

NSW Office of Water (2012). Guidelines for riparian corridors on waterfront land. Published by NSW Department of Primary Industries.

NSW Scientific Committee (2008). *Swainsona murrayana* Review of current information in NSW. Unpublished report arising from the Review of the Schedules of the Threatened Species Conservation Act 1995. NSW Scientific Committee, Hurstville.

OEH (2018). Biodiversity Assessment Method Operational Manual – Stage 1. State of NSW and Office of Environment and Heritage.

OEH (2014). BioBanking Assessment Methodology. September 2014. Office of Environment and Heritage.

VIS (2020). Bionet Vegetation Classification Database. Last updated 10/06/2020.

<<https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>>

Annex 1. Plant community description

PCT 155: Bluebush shrub land on stony rises and downs in the arid and semi-arid zones

Extent:

This community was present throughout the Modification Area (disturbance footprint), occupying an area of 0.91 ha.

Condition and presence of weeds:

Within the study area PCT 155 occurs in low (0.9 ha) (Plate 1) and moderate (0.01 ha) (Plate 2) condition states. It has been subject to recent vegetation clearing and use of areas for equipment storage. It is acknowledged that some native plants typical of this PCT may have been dormant at the time of survey; preceding rains or seasonality having the potential to affect detection. Weeds of National Significance (WONS) observed include *Lycium ferocissimum* (African Boxthorn) and *Prosopis velutina* (Velvet Mesquite). Both are also a High Threat Weed (HTW) under the BAM.

Conservation status:

This community has an associated TEC, being *Acacia loderi* shrublands (Part) which is listed as Endangered under the BC Act. Where *Acacia loderi* (Nelia) occurs within PCT 155 vegetation, it is likely to form part of the *Acacia loderi* Shrublands TEC. No *Nelia* individuals were identified within the study area and thus no vegetation within the study area forms part of this TEC.

Characteristic species used for identification of PCT:

The key diagnostic species used to identify this PCT in the study area were *Sclerolaena* (Copper-burr), *Maireana pyramidata* (Black Bluebush), Thorny Saltbush (*Rhagodia spinescens*), Bladder Saltbush (*Atriplex vesicaria*), and *Atriplex stipitata* as listed in the BioNet VIS (DPIE 2020d).

Justification of evidence used to identify the PCT:

While cover is sparse, there are sufficient plant species present to consider it as a native PCT.

The description of PCT 155, as provided in the BioNet VIS (DPIE 2020d), is highly consistent with the geographic location, habitat and floristics of this PCT as identified in the study area. Key matching characteristics include:

- Its geological and geographical occurrence on red or brown clays, calcareous red loams and skeletal soils derived from shales, ferruginous sandstone and other substrates, often containing gibbers on undulating gibber plains, stony rises, adjoining slopes and associated drainage lines. Distributed in the Barrier Ranges north of Broken Hill and the Noonthorrangee Range west of White Cliffs in the arid zone of far north-western NSW and extending into South Australia.
- Its species composition which matches that described in the BioNet VIS (DPIE 2020d), namely the presence of key dominant diagnostic species Black Bluebush (*Maireana pyramidata*) along with associated shrub and understorey species as listed above.

Other PCTs considered

Numerous other PCTs were considered including taller shrubland communities PCT 139 and PCT 143 at the request of BCD. In regard to the suggested presence of PCT 143 and 139 both of these are known to occur as derived communities. For example, Bionet states (DPIE 2020d) PCT 143 “Occurs as a natural community in some areas, especially on dunes (some of these have been largely wiped out by rabbits). Otherwise probably an expanded community. Probably derived from a variety of communities.” and “Narrow-leaved Hopbush and Turpentine are prolific colonisers of disturbed sites being non-palatable to stock. They have become “woody weeds” in places”.

Species such as *Senna* and Narrow-leaved Hop-bush are often pioneer species that colonise areas of previous disturbance with reduction in shrub/ground cover and therefore presence of these species may not be representative of the original PCT. Section 4.2 BAM 2020 states that assessors must not identify native vegetation as a derived PCT in the BioNet Vegetation Classification. Assessors must identify the original PCT from which the derived PCT has developed.

The entire area is mapped as PCT 155 (DPIE 2019c) and areas mapped as PCTs 139 and 143 are likely to be characterised by a reasonably consistent presence and density of taller shrubs. There is relatively low cover of tall shrubs within the mapped zone and these may partly be present due to previous disturbance, or an intergrading of

PCT 155: Bluebush shrub land on stony rises and downs in the arid and semi-arid zones

communities. There is no geomorphological or geological evidence to support a separate community/PCT within the BESS site where there is some increased cover of taller shrubs.

Photographs:



Plate 1: PCT 155 – Low condition (plot 3)



Plate 2: PCT 155 – Moderate condition (plot 1)

Annex 2. Floristic plot data

Table 20: Floristic plot cover (%) data³

Family	Scientific name	Common name	BAM Plot 1	BAM Plot 2	BAM Plot 3	BAM Plot 4
Aizoaceae	<i>Sarcozona praecox</i>	Sarcozona			0.1	
Asteraceae	<i>Ambrosia artemisiifolia</i> *	Annual Ragweed	0.5			
Asteraceae	<i>Brachyscome ciliaris</i>	Variable Daisy	0.2			
Asteraceae	<i>Calotis spp.</i>	A Burr-daisy	1			
Asteraceae	<i>Lactuca serriola</i> *	Prickly Lettuce				0.1
Asteraceae	<i>Onopordum acanthium</i> *					0.1
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sowthistle	0.1			
Asteraceae	<i>Xanthium ambrosioides</i> *		0.1			
Boraginaceae	<i>Heliotropium supinum</i> *	Prostrate Heliotrope	0.1			
Chenopodiaceae	<i>Atriplex nummularia</i>	Old Man Saltbush	20			
Chenopodiaceae	<i>Atriplex spp.</i>	A Saltbush	0.1			
Chenopodiaceae	<i>Atriplex stipitata</i>	Mallee Saltbush			0.1	0.1
Chenopodiaceae	<i>Atriplex vesicaria</i>	Bladder Saltbush	5			
Chenopodiaceae	<i>Dissocarpus paradoxus</i>	Cannonball Burr	0.1		1	
Chenopodiaceae	<i>Maireana brevifolia</i>					5
Chenopodiaceae	<i>Maireana pyramidata</i>	Black Bluebush	20	30	0.1	
Chenopodiaceae	<i>Maireana spp.</i>	Cotton Bush, Bluebush, Fissure-weed				1
Chenopodiaceae	<i>Maireana turbinata</i>				2	
Chenopodiaceae	<i>Rhagodia spinescens</i>	Thorny Saltbush	15	10		0.2
Chenopodiaceae	<i>Sclerolaena divaricata</i>	Tangled Copperburr	0.1		10	
Chenopodiaceae	<i>Sclerolaena spp.</i>	Copperburr, Poverty-bush		0.1		
Chenopodiaceae	<i>Sclerolaena tricuspis</i>	Giant Redburr		1		

³ BAM Plots 1 and 3 were used for BAM-C calculations and are also referred to as vegetation zone PCT 155_Moderate and PCT 155_Low, respectively. It is noted the other plots are not assigned a vegetation zone as they were not used within the BAM-C.

Family	Scientific name	Common name	BAM Plot 1	BAM Plot 2	BAM Plot 3	BAM Plot 4
Fabaceae (Caesalpinioideae)	<i>Senna artemisioides subsp. zygomphyla</i>				4	
Fabaceae (Caesalpinioideae)	<i>Senna artemisioides subsp. filifolia</i>		5	10	2	
Fabaceae (Faboideae)	<i>Medicago praecox*</i>	Small-leaved Burr Medic	0.5			
Fabaceae (Faboideae)	<i>Vicia sativa*</i>	Common vetch	0.1			
Fabaceae (Mimosoideae)	<i>Acacia victoriae subsp. arida</i>		2		2	
Fabaceae (Mimosoideae)	<i>Prosopis velutina*</i>	Velvet Mesquite	2			
Malvaceae	<i>Sida corrugata</i>	Corrugated Sida	0.1			
Myoporaceae	<i>Eremophila spp.</i>		0.1			
Myrtaceae	<i>Eucalyptus spp.</i>			7		
Nitrariaceae	<i>Nitraria billardierei</i>	Dillon Bush			1	
Papaveraceae	<i>Argemone ochroleuca*</i>					0.1
Poaceae	<i>Cynodon dactylon</i>	Common Couch	0.1			
Poaceae	<i>Enneapogon avenaceus</i>	Bottle Washers	0.1			
Solanaceae	<i>Lycium ferocissimum*</i>	African Boxthorn	1			10
Zygophyllaceae	<i>Roepera eremaea</i>	Climbing Twinleaf			0.1	

* exotic species

Table 21: Digital field survey data for each plot⁴

Waypoint ID	Species Number	Genus	Species	Cover	Abundance	Growth Form
5475pm01	2063	<i>Atriplex</i>	<i>nummularia</i>	20		Shrub (SG)
5475pm01	2142	<i>Maireana</i>	<i>pyramidata</i>	20		Shrub (SG)
5475pm01	2161	<i>Rhagodia</i>	<i>spinescens</i>	15		Shrub (SG)
5475pm01	2078	<i>Atriplex</i>	<i>vesicaria</i>	5		Shrub (SG)
5475pm01	3905	<i>Prosopis</i>	<i>velutina</i>	2	5	HTW
5475pm01	8492	<i>Senna</i>	<i>artemisioides</i>	5		Shrub (SG)
5475pm01	2923	<i>Medicago</i>	<i>praecox</i>	0.5	100	Weed other
5475pm01	6540	<i>Cynodon</i>	<i>dactylon</i>	0.1	5	Grass & grasslike (GG)
5475pm01	1259	<i>Ambrosia</i>	<i>artemisiifolia</i>	0.5	1500	Weed other
5475pm01	6040	<i>Lycium</i>	<i>ferocissimum</i>	1	5	HTW
5475pm01	3097	<i>Vicia</i>	<i>sativa</i>	0.1	50	Weed other
5475pm01	7902	<i>Brachyscome</i>	<i>ciliaris</i>	0.2	20	Forb (FG)
5475pm01	ATRI	<i>Atriplex</i>	<i>spp.</i>	0.1	20	Shrub (SG)
5475pm01	1762	<i>Heliotropium</i>	<i>supinum</i>	0.1	25	Weed other
5475pm01	EREM	<i>Eremophila</i>	<i>spp.</i>	0.1	5	Shrub (SG)
5475pm01	1690	<i>Sonchus</i>	<i>oleraceus</i>	0.1	25	Weed other
5475pm01	2103	<i>Dissocarpus</i>	<i>paradoxus</i>	0.1	1	Shrub (SG)
5475pm01	3664	<i>Sida</i>	<i>corrugata</i>	0.1	10	Forb (FG)
5475pm01	1725	<i>Xanthium</i>	<i>ambrosioides</i>	0.1	1	Weed other
5475pm01	2178	<i>Sclerolaena</i>	<i>divaricata</i>	0.1	5	Shrub (SG)
5475pm01	9537	<i>Acacia</i>	<i>victoriae</i>	2	5	Shrub (SG)
5475pm01	6720	<i>Enneapogon</i>	<i>avenaceus</i>	0.1	25	Grass & grasslike (GG)
5475pm01	CALI	<i>Calotis</i>	<i>spp.</i>	1	25	Forb (FG)

⁴ BAM Plots 1 and 3 were used for BAM-C calculations and are also referred to as vegetation zone PCT 155_Moderate and PCT 155_Low, respectively. It is noted the other plots are not assigned a vegetation zone as they were not used within the BAM-C.

Waypoint ID	Species Number	Genus	Species	Cover	Abundance	Growth Form
5475pm02	2142	<i>Maireana</i>	<i>pyramidata</i>	30		Shrub (SG)
5475pm02	2161	<i>Rhagodia</i>	<i>spinescens</i>	10		Shrub (SG)
5475pm02	8492	<i>Senna</i>	<i>artemisioides</i>	10		Shrub (SG)
5475pm02	2192	<i>Sclerolaena</i>	<i>tricuspis</i>	1	50	Shrub (SG)
5475pm02	EUCA	<i>Eucalyptus</i>	<i>spp.</i>	7	2	Tree (TG)
5475pm02	SCLR	<i>Sclerolaena</i>	<i>spp.</i>	0.1	8	Shrub (SG)
5475pm03	2178	<i>Sclerolaena</i>	<i>divaricata</i>	10		Shrub (SG)
5475pm03	9537	<i>Acacia</i>	<i>victoriae</i>	2	1	Shrub (SG)
5475pm03	6345	<i>Nitraria</i>	<i>billardiarei</i>	1	5	Shrub (SG)
5475pm03	2152	<i>Maireana</i>	<i>turbinata</i>	2	50	Shrub (SG)
5475pm03	6353	<i>Zygophyllum</i>	<i>eremaeum</i>	0.1	10	Forb (FG)
5475pm03	2103	<i>Dissocarpus</i>	<i>paradoxus</i>	1	75	Shrub (SG)
5475pm03	8492	<i>Senna</i>	<i>artemisioides</i>	2	15	Shrub (SG)
5475pm03	2073	<i>Atriplex</i>	<i>stipitata</i>	0.1	50	Shrub (SG)
5475pm03	1037	<i>Sarcozona</i>	<i>praecox</i>	0.1	1	Forb (FG)
5475pm03	2142	<i>Maireana</i>	<i>pyramidata</i>	0.1	5	Shrub (SG)
5475pm03	12327	<i>Senna</i>	<i>artemisioides</i> <- >-> <i>zygophylla</i>	2	15	Shrub (SG)
5475pm03	12327	<i>Senna</i>	<i>artemisioides</i> <- >-> <i>zygophylla</i>	2	15	Shrub (SG)
5475pm04	6040	<i>Lycium</i>	<i>ferocissimum</i>	10		HTW
5475pm04	2122	<i>Maireana</i>	<i>brevifolia</i>	5		Shrub (SG)
5475pm04	1550	<i>Lactuca</i>	<i>serriola</i>	0.1	30	Weed other
5475pm04	1619	<i>Onopordum</i>	<i>acanthium</i>	0.1	40	Weed other
5475pm04	4630	<i>Argemone</i>	<i>ochroleuca</i>	0.1	25	Weed other
5475pm04	2161	<i>Rhagodia</i>	<i>spinescens</i>	0.2	5	Shrub (SG)
5475pm04	2073	<i>Atriplex</i>	<i>stipitata</i>	0.1	1	Shrub (SG)
5475pm04	MAIR	<i>Maireana</i>	<i>spp.</i>	1	100	Shrub (SG)

Annex 3. BAM plot transect scores

Plot no.	PCT code	PCT abbreviated name and condition	Species richness							Cover (%)						
			Tree	Shrub	Grass	Forb	Fern	Other	High threat weed	Tree	Shrub	Grass	Forb	Fern	Other	High threat weed
1	155	Bluebush shrub land on stony rises and downs in the arid and semi-arid zones – moderate condition	0	10	2	3	0	0	2	0	67.4	0.2	1.3	0	0	3
2	155	Bluebush shrub land on stony rises and downs in the arid and semi-arid zones – low condition	1	5	0	0	0	0	0	7	51.1	0	0	0	0	0
3	155	Bluebush shrub land on stony rises and downs in the arid and semi-arid zones – low condition	0	10	0	2	0	0	0	0	22.2	0	0.2	0	0	0
4	155	Bluebush shrub land on stony rises and downs in the arid and semi-arid zones – low condition	0	4	0	0	0	0	1	0	6.3	0	0	0	0	10

* 1 m² litter quadrats were placed at 5 m (left), 15 m (right), 25 m (left), 35 m (right) and 45 m (left) along the central 50 m transect, all positioned 5 m from the transect centreline and alternating to the left and right from the transect centreline (as indicated).

Note: field data were collected in electronic format, therefore raw data sheets have not been provided.

Annex 4. Fauna species list

Scientific name	Common name	Observation type
Birds		
<i>Corvus coronoides</i>	Australian Raven	Observed
<i>Epthianura aurifrons</i>	Orange chat	Observed
Mammals		
<i>Oryctolagus cuniculus</i>	European Rabbit	Signs/scats
<i>Macropous robustus erubescens</i>	Euro	Observed
Reptiles		
<i>Tiliqua rugosa</i>	Shingleback	Observed

Note: field data were collected in electronic format, therefore raw data sheets have not been provided.

Annex 5. Threatened species status and likelihood of occurrence

E = Endangered; V = Vulnerable, CE = Critically Endangered, R = Rare, Ex = Presumed Extinct.

Unless otherwise stated, habitat information obtained from DoEE 2021 and DPIE 2021b.

Note: fish and marine species have been excluded from this table due to the absence of habitat in proximity to the study area.

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
Birds					
<i>Actitis hypoleucos</i>	Common Sandpiper		M	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. They have been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep.	None
<i>Amytornis modestus</i>	Thick-billed Grasswren	CE	V	The Thick-billed Grasswren is sedentary, usually inhabiting dense, low saltbush, cottonbush, bluebush and nitre-bush areas on sandy plains or depressions in gibber; also occurs along watercourses in clumps of Canegrass; when disturbed, individuals take refuge in any available cover, including piles of old flood debris along dry sandy watercourses and down rabbit burrows.	Low – known from one population at Packsaddle approximately 175 km to the north of Broken Hill
<i>Apus pacificus</i>	Fork-tailed Swift		M	In Australia, Fork-tailed Swifts mostly occur over inland plains but sometimes above foothills or in coastal areas, where they often occur over cliffs and beaches and also over islands and sometimes well out to sea, as well as over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes.	Low

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Ardeotis australis</i>	Australian Bustard	E		The Australian Bustard mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. In NSW, they are mainly found in the north-west corner and less often recorded in the lower western and central west plains regions. Occasional vagrants are still seen as far east as the western slopes and Riverine plain. Breeding now only occurs in the north-west region of NSW. Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams. Breeds on bare ground on low sandy ridges or stony rises in ecotones between grassland and protective shrubland cover; roosts on ground among shrubs and long grasses or under trees. Forages on insects, young birds, lizards, mice, leaves, seeds and fruit. Dispersive, with irregular widespread movements over long distances; movements are thought to be in response to habitat and climatic conditions; known to converge on areas with high mice numbers and in recently burnt areas.	Moderate
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	Dusky Woodswallows are often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. They have also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	Low
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia are they still common however and in the south-east it is either rare or extinct throughout their former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	None
<i>Calamanthus campestris</i>	Rufous Fieldwren	V		The Rufous Fieldwren inhabits low shrublands, particularly saltbush and bluebush communities, and also areas around inland saline lakes.	Moderate
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season.	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). They occur along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. They generally occupy littoral and estuarine habitats, and in NSW are mainly found in intertidal mudflats of sheltered coasts. They also occur in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	None
<i>Calidris melanotos</i>	Pectoral Sandpiper		M	In Australasia, 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.	None
<i>Certhionyx variegatus</i>	Pied Honeyeater	V		Pied Honeyeaters are widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. They occasionally occur further east, on the slopes and plains and the Hunter Valley, typically during periods of drought. They inhabit wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	Low
<i>Circus assimilis</i>	Spotted Harrier	V		The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including <i>Acacia</i> and mallee remnants, inland riparian woodland, grassland and shrub steppe. They are found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Low
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		The Brown Treecreeper is found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Low
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	The Varied Sittella inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature eucalypts with hollows.	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Epthianura albifrons</i>	White-fronted Chat	V		The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 metres above sea level. In NSW, they occur 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, they are found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas.	Moderate
<i>Falco hypoleucos</i>	Grey Falcon	E	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid.	Low
<i>Falco subniger</i>	Black Falcon	V		The Black Falcon is widely, but sparsely, distributed in NSW, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of NSW are likely to be referable to the Brown Falcon.	Low
<i>Gallinago hardwickii</i>	Latham's Snipe		M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 metres above sea-level (Chapman 1969; Naarding 1981). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (Frith et. al. 1977; Naarding 1983; Weston 2006, pers. comm.). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al. 1977; Naarding 1983).	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Grantiella picta</i>	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Low
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V		The Black-breasted Buzzard is found sparsely in areas of less than 500 millimetres rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. They live in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. They also hunt over grasslands and sparsely timbered woodlands.	Low
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Little Eagles are most abundant in lightly timbered areas with open areas nearby. They are often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. They may nest in farmland, woodland and forest in tall trees.	Low
<i>Lophocroa leadbeateri</i>	Major Mitchell's Cockatoo	V		Major Mitchell's Cockatoos are found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW they are found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	Low

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Lophoictinia isura</i>	Square-tailed Kite	V		The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 km ² . Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Low – flyover only
<i>Melanodryas cucullata</i>	Hooded Robin (south-eastern form)	V		The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, they are common in few places, and rarely found on the coast. They are considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Low
<i>Motacilla cinerea</i>	Grey Wagtail		M, MA	This species has a strong association with water. In their normal breeding range, Grey Wagtails are found across a variety of wetlands, especially water courses, but also on the banks of lakes and marshes, as well as artificial wetlands such as sewage farms, reservoirs and fishponds. This association with water extends into non-breeding habitats with all confirmed Australian records being associated with water; especially creeks, rivers and waterfalls. On migration they may forage on rocky tidal flats.	None
<i>Motacilla flava</i>	Yellow Wagtail		M, MA	The Yellow Wagtail occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra.	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Oxyura australis</i>	Blue-billed Duck	V		The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	None
<i>Pedionomus torquatus</i>	Plains Wanderer	CE	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	None
<i>Pezoporus occidentalis</i>	Night Parrot	Ex	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterised by the presence of large and dense clumps of Spinifex, and they may prefer mature spinifex that is long and unburnt.	None – listed as extinct within area
<i>Phaps histrionica</i>	Flock Bronzewing	E		Patchily distributed and rarely observed in NSW. It is likely to occur north of Broken Hill and west of Cobar when conditions are right. The extensive Mitchell grasslands around Brewarrina and Goodooga should also provide suitable habitat. Observed in a variety of vegetation types, including grassy plains, saltbush, spinifex and open mulga. Its preferred habitat is tussock grassland, particularly Mitchell grassland. They need to drink daily and may be seen adjacent to water, e.g. at stock tanks, bore drains and pools in water courses. Rest on the ground during the day and nest in a simple scrape on the ground in the cover of a bush, low branch, grass tussock, or in dust on bare ground around bores, often in close proximity to many others of the same species. Fairly common; highly nomadic, this species was named because of its tendency to form huge flocks (e.g. flocks of up to 100,000 birds were noted during the 1930s). Flocks of over a thousand are rare today.	Moderate – may occur on occasion

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Pomatostomus halli</i>	Hall's Babbler	V		It occurs in central-eastern Australia, from Cobar north into south-western Queensland, particularly along or west of the Warrego Rive. These birds have been recorded from the White Cliffs area through to the Culgoa River, Nocoleche Nature Reserve, Sturt National Park and Mutawintji National Park. Recently recorded in Mulga groves near Ledknapper Creek (1993) and near Mt Gunderbooka (1994). Inhabits dry <i>Acacia</i> scrub, mainly Mulga, with a grassy understorey including spinifex, on ridges and plains with either sandy or stony soils. Occasionally occurs in open dry <i>Eucalyptus</i> (Bimblebox) woodland, and mulga- or eucalypt-lined watercourses. Hall's Babblers construct neat spherical dome nests, each with a side entrance, from twigs within the outer branches of acacias, in the upright forks of mulgas and <i>Casuarina</i> , or in a horizontal eucalypt branch 3-10 m above the ground. Probably sedentary, maintaining home ranges of up to several hectares which contain a clump of roosting nests, each securely attached to small branches just inside the foliage, 3-7 m above the ground. Appear to occur in very localised patches.	Low
<i>Pyrholaemus brunneus</i>	Redthroat	V		In NSW the Redthroat has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill they appear to be associated with the denser vegetation, particularly Acacias, found in drainage lines that run from the rocky hills. In other locations they are known from Canegrass and Lignum swamps and depressions, particularly on floodplains.	Moderate
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	None
<i>Stictonetta naevosa</i>	Freckled Duck	V		The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Tyto longimembris</i>	Eastern Grass Owl	V		Eastern Grass Owls have been recorded occasionally in all mainland states of Australia but are most common in northern and north-eastern Australia. In NSW they are more likely to be resident in the north-east. Eastern Grass Owl numbers can fluctuate greatly, increasing especially during rodent plagues. Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth. If disturbed they burst out of cover, flying low and slowly, before dropping straight down again into cover. Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.	Low
Mammals					
<i>Chalinolobus picatus</i>	Little Pied Bat	V		The Little Pied Bat occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. They can tolerate high temperatures and dryness but need access to nearby open water.	None
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Females occupy home ranges of 200-500 ha, while males occupy very large home ranges from 500 to over 4000 ha. Are known to traverse their home ranges along densely vegetated creeklines.	Low
<i>Notomys fuscus</i>	Dusky Hopping-mouse	E	V	The Dusky Hopping-mouse is nocturnal and terrestrial, feeding primarily on seeds and green vegetation insects. They do not need to drink. Most records are from sand dunes, hills and ridges associated with perennial Sandhill Canegrass (<i>Zygochloa paradoxa</i>), Dillon Bush (<i>Nitraria billardierei</i>) and Acacia species, characteristic of the Simpson Strzelecki Dunefields Bioregion. In contrast, the southern-most record in NSW was from the Broken Hill Complex Bioregion, and collected in Bluebush (<i>Maireana pyramidata</i>) chenopod shrubland near a drainage line with River Red Gums (<i>Eucalyptus camaldulensis</i>), Prickly Wattle (<i>Acacia victoriae</i>) and Western Boobiala (<i>Myoporum montanum</i>).	Moderate

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Corben's Long-eared Bat inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but they are distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	None
<i>Pseudomys bolami</i>	Bolam's Mouse	E		Bolam's Mouse has been recorded in a wide variety of habitats, with a preference for chenopod shrubland plains or low mallee woodland where there is a developed understorey of <i>Acacia</i> , <i>Dodonaea</i> or <i>Eremophila</i> species. They seem to especially favour plains areas, spillways and along valley bottoms where loam or clay soils occur. It has been recorded in four broad vegetation types in Tarawi Nature Reserve: Mallee-spinifex, Mallee shrubland, Belah woodland and Mixed open shrubland/woodland.	Low
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-	The Yellow-bellied Sheathtail-bat roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	V		Stripe-faced Dunnart are found throughout much of inland central and northern Australia, extending into central and northern NSW, western Queensland, Northern Territory, South Australia and Western Australia. They are rare on the NSW Central West Slopes and North West Slopes with the most easterly records of recent times located around Dubbo, Coonabarabran, Warialda and Ashford. Native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better. They shelter in cracks in the soil, in grass tussocks or under rocks and logs.	Moderate
Reptiles					
<i>Antaresia stimsoni</i>	Stimson's Python	V		Occurs in north-west NSW, from Bourke and Gundabooka National Park in the east to Broken Hill and Wilcannia in the south. A terrestrial and semi-arboreal species that inhabits a wide range of arid and semi-arid environments including rock outcrops, sandy plains and dunefields where it is associated with larger trees and termite mounds. The species occupies a broad spectrum of habitats includes woodlands, shrublands (including <i>Acacia</i> and chenopods) and hummock grasslands, where rocky outcrops provide caves and deep crevices and where tree-lined watercourses provide numerous low hollows and fallen trees.	Low

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Aspidites ramsayi</i>	Woma	V		The Woma occurs in north-western NSW, east to about Louth and Bourke. It was last recorded in these eastern districts in the late 1890s, and in 1983 from the Tibooburra region. Its range and abundance in south-eastern Australia is considered to be undergoing serious decline. Terrestrial, inhabiting subtropical to temperate deserts and sandy plains, as well as dunefields and deep cracking black soil plains in semi-arid areas. Occurs in hummock grasslands, shrublands or woodlands and shelters in animal burrows, hollow logs or under grass hummocks.	Moderate
<i>Ctenophorus mirrityana</i>	Barrier Range Dragon	E		The Barrier Range Dragon is currently known from three highly restricted and fragmented sites near Mutawintji National Park and Broken Hill. They are restricted to rock outcrops in ranges and gorges. They are absent from apparently suitable habitat in NSW. Diurnal, basking on exposed rocks.	None
<i>Cyclodomorphus melanops elongatus</i>	Mallee Slender Blue-tongued Lizard	E		The species is widely distributed in inland areas of all mainland states (except Victoria) and the Northern Territory, with the subspecies <i>elongatus</i> occurring from southern Western Australia to central Queensland. In NSW it is restricted to the far south west with records scattered from mallee areas either side of the Darling River (including the Scotia mallee and Mungo and Mallee Cliffs National Parks). Recent surveys have detected this species in spinifex occurring on rocky hillsides to the north west of Broken Hill, a range extension over 100 km in NSW. In NSW, animals inhabit mallee/spinifex communities on a sandy or mixed sand/gravel substrate (plains, ridges or hillslopes). It is assumed that the species seeks refuge in vegetation clumps such as spinifex and in fallen timber and leaf litter.	Low
<i>Delma australis</i>	Marble-faced Delma	E		In NSW, the Marble-faced Delma appears to be restricted to temperate mallee woodlands or spinifex grasslands but elsewhere is also found in chenopod shrublands, heathlands and buloke associated with mallee habitats or eucalypt lined watercourses. The species occupies areas with a sandy substrate but may also utilise cracking red loam soils, but has also recently been recorded in spinifex on rocky hillsides. They are found in deep leaf litter, under rocks, logs, fallen timber or in grass clumps such as spinifex. They are considered to be terrestrial although they may climb into hummock grass and even sleep in the branches of small shrubs.	Low
<i>Pseudonaja modesta</i>	Ringed Brown Snake	E		Determined on the basis of only limited records until recently, the Ringed Brown Snake thought to occupy the north-west portion of the state having been recorded from Tarawi Nature Reserve, 140 km south of Broken Hill, Silverton, Tibooburra, Wanaaring and from Kilberoo, 140 km north-west of Bourke. Recent surveys have identified a large population in the Scotia Sanctuary-Tarawi NR region. They are a terrestrial species that inhabits drier areas including rocky outcrops and dry watercourses. They occur in a variety of vegetation types including woodlands, shrublands, mallee and grasslands. By night they shelter in ground debris or abandoned animal burrows.	Moderate

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	V		There are scattered records of Western Blue-tongued Lizard across central western and western NSW. No observations from northwest NSW to date. Diurnally forages for insects, snails, native vegetation and carrion. Inhabits plains, swales, ranges and sometimes dunes of loamy or clayey/sandy soils vegetated by woodlands, especially mallee, shrublands (including chenopods), heaths or hummock grasslands. Preferred vegetation type appears to be mixed mallee/ <i>Triodia</i> communities. Terrestrial, and known to utilise rabbit warrens for shelter.	Low
Flora					
<i>Acacia carneorum</i>	Purple-wood Wattle	V	V	Purple-wood Wattle grows in grassland and woodland in red, sandy soil; also found in Mulga communities on sand dunes, level sandy sites and alluvial accumulations along watercourses; recorded from inland semi-arid Acacia and Casuarina shrublands and woodlands. Preferred soils are shallow, calcareous and loamy, and include brown earths, crusty alkaline soils and neutral red duplex soils; confined to red-earth dune soils in Kinchega NP as a dominant or occasionally co-dominant, usually on dune crests or slopes.	Low
<i>Acacia notabilis</i>	Mallee Golden Wattle	E		Mallee Golden Wattle occurs west from Menindee in the far western plains of NSW. Early collections come from Byrnedale Station near Menindee and a locality south of Broken Hill. They are known in Victoria from two disjunct locations in the central-north and north-west. They are common throughout some regions of South Australia, and grow in mallee communities and open woodland on stony and rocky hills; soil types include brown lateritic loam, red clay-loam, shallow stony sands and red silty gravely sand.	None – absent from study area
<i>Acacia rivalis</i>	Creek Wattle	V	V	The Creek Wattle has been recorded from the Broken Hill district, but was originally found in SA, where it was described as being endemic and confined to the northern part of the Flinders Ranges region. There is a possibility that the species did not occur naturally in New South Wales but has become naturalised in a restricted area near Broken Hill. In NSW, <i>Acacia rivalis</i> is confined to woodland communities bordering ephemeral creeks and streams and along watercourses. They grow in a variety of stony soils, often with limestone content.	None
<i>Frankenia plicata</i>			E	<i>Frankenia plicata</i> grows in a range of habitats, including on small hillside channels, which take the first run-off after rain (Leigh et al., 1984). In the Simpson Desert, the species has been found predominantly from swales of loamy sands to clay (Neagle, 2002). This species is found in a wide range of vegetation communities that have good drainage (Neagle, 2002).	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Indigofera longibractea</i>	Showy Indigo	E		Showy Indigo is restricted to an area just north of Broken Hill known as the Waukeroo Hills. They also occur in SA at sites in the Musgrave and Flinders Ranges. They are found on rocky hills and creek beds, growing in limited numbers in shallow stony soils among rock outcrops. Across their range they occupy a variety of rocky habitats, ranging from creeks to scree slopes and ridges.	None
<i>Lepidium monoplacoides</i>	Winged Peppergrass	E	E	Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bullock) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising <i>Eragrostis australasicus</i> , <i>Agrostis avenacea</i> , <i>Austrodanthonia duttoniana</i> , <i>Homopholis proluta</i> , <i>Myriophyllum crispatum</i> , <i>Utricularia dichotoma</i> and <i>Pycnosorus globosus</i> , on waterlogged grey-brown clay. Also recorded from a <i>Maireana pyramidata</i> shrubland. Flowers from late winter to spring, or August to October.	Low
<i>Solanum karsense</i>	Menindee Nightshade	V	V	Menindee Nightshade is a species of <i>Solanum</i> endemic to NSW, restricted to the far south-western plains, extending up the Darling River to the Menindee and Wilcannia districts. Mainly restricted to the area between the Darling and Lachlan Rivers. Localities include Kars Station, Lake Tandou, Lake Cawndilla, Oxley area, between Broken Hill and Menindee, and the Darling River. They have been recorded from Kincheha National Park and Nearie Lake Nature Reserve. They grow in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonised brown soils. Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. They are also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.	None

Scientific name (Data source)	Common name	NSW BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Swainsona flavicarinata</i>	Yellow-keeled Swainsona	E		Not common in NSW, having an outlier population in the Broken Hill-Menindee district in the far western plains. More common in the southern parts of the NT and inland SA. Grows in deep red sand, recorded from a roadside on a treeless plain in NSW. In central Australia, the species grows in Mulga communities on red earths and on stony soils supporting Bladder Saltbush. Also found on sandy plains and ridges, in grassland, and in watercourses and floodplains near creeks or rock holes. Associated species include <i>Acacia murrayana</i> , <i>A. aneura</i> , <i>Maireana aphylla</i> , <i>Atriplex vesicaria</i> , <i>Triodia</i> , <i>Solanum</i> and <i>Euphorbia</i> spp.	Low – not detected during targeted surveys
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	The Slender Darling Pea is found throughout NSW, being recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Low – marginal habitat within better condition areas of the study area only, which have been avoided through Project design/site selection. Not detected during targeted surveys

Annex 6. EPBC Act Significant Impact Criteria Assessment

Assessments of Significance and supplementary information (where relevant) are presented for the following MNES in relation to the Modification:

- Threatened Fauna
 - Dusky Hopping-mouse (*Notomys fuscus*).

Dusky Hopping-mouse (*Notomys fuscus*) (Vulnerable)

Distribution

The Dusky Hopping-mouse occurs in north-eastern South Australia, in the southern Strzelecki and the Cobblers Deserts (Ehmann & Watson, undated), north-western NSW and southwestern Queensland. It is possible the species distribution may extend as far south as Mutawintji, in central-western NSW (Moseby *et al.*, 1999). The Dusky Hopping-mouse occurs within the Sturt National Park, Lake Eyre National Park, and Strzelecki Regional Reserve (DEC, 2005; EPA, 2006; Ehmann & Watson, undated). In NSW it occurs within the Western Natural Resources Management Regions.

Life cycle, habitat requirements and site

It is a nocturnal and terrestrial rodent which feeds primarily on seeds, and also green vegetation and insects. It does not need to drink. Lives in stable colonies of up to five individuals in a burrow system. Forages on open sand areas, rarely venturing into surrounding habitats. The Dusky Hopping-mouse inhabits a variety of soft sandy habitats, preferring sand dunes, hills and ridges with Cane Grass (*Ophiuros exaltatus*), Sandhill Wattle (*Acacia ligulata*), Nitrebush (*Nitraria billardiera*), Sticky Hopbush (*Dodonea viscosa*) and other annual and perennial shrubs (Watts, 1995; DEC, 2005; EPA, 2006; Ehmann & Watson, undated). In contrast, the southern-most record in NSW was from the Broken Hill Complex Bioregion, and collected in Bluebush (*Maireana pyramidata*) chenopod shrubland near a drainage line with River Red Gums (*Eucalyptus camaldulensis*), Prickly Wattle (*Acacia victoriae*) and Western Boobiala (*Myoporum montanum*).

A common characteristic of many Australian desert rodents are large fluctuations in their population densities. Rainfall is usually considered to be the major influence on populations of these rodents (Finlayson 1939; Dickman 1993; Predavec 1994; Dickman *et al.* 1999). Populations increase after rainfall (with a time-lag) and the subsequent increase in food abundance (Predavec 1994; Southgate and Masters 1996; Dickman *et al.* 1999). With the onset of drought conditions populations can crash precipitously (Klöcker 2009).

Survey/records within the Site and surrounds

There is one record of a dead Dusky Hopping-mouse (cat kill) recorded in the front garden of a house in Broken Hill, approximately 5.5 km from the study area.

Impact Summary

The Modification would require removal of 0.91 ha of native vegetation providing potential habitat for the Dusky Hopping-mouse. However, given the limited records of this species in bluebush shrubland, the degraded state of the Modification Area, and the lack of tracks or burrows, it is unlikely to rely on habitat within the Modification Area.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

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

The Modification would require the removal of approximately 0.91 ha of potential habitat for the Dusky Hopping-mouse. Habitat within the Modification Area is in low condition, consisting of bluebush shrubland that is atypical habitat for this species. Moderate condition habitat is being avoided. Due to current disturbances, including the presence of European Rabbits, and the patchy shelter and foraging habitat within the study area, it is unlikely that the Modification would lead to a long-term decrease in the size of an important population.

2. reduce the area of occupancy of an important population

As the Modification Area is unlikely to contain a population due to current disturbances and patchy habitat, the removal of 0.91 ha of bluebush habitat is unlikely to reduce the area of occupancy of the species.

3. fragment an existing important population into two or more populations

As the Modification Area is unlikely to contain a population due to current disturbances and patchy habitat, the Project is unlikely to fragment a population into two or more populations.

4. adversely affect habitat critical to the survival of a species

Critical habitat has not been defined for this species. The Modification Area is unlikely to contain habitat critical to the survival of the species.

5. disrupt the breeding cycle of an important population

The following is known about the breeding cycle of the Dusky Hopping-mouse (NSW SC 2004):

- Inhabits vegetated sand dunes and excavates tunnels that are up to 5m in length, which are accessed via vertical 1m deep shafts.
- Nesting is communal with up to five individuals sharing a tunnel system
- Litter sizes of four to five have been recorded (Klocker 2009)
- Populations can irrupt during favourable conditions – after rainfall and the subsequent increase in food abundance

As the Modification Area is unlikely to contain a population due to current disturbances and patchy habitat, the Modification is unlikely to disrupt the breeding cycle of an important population.

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

The Modification would require the removal of 0.91 ha of low condition native vegetation that would provide potential shelter and foraging habitat for the Dusky Hopping-mouse. Given the current disturbances at the within the Modification Area (e.g. presence of rabbits, multiple informal tracks), that habitat is in low condition, and that the vegetation is atypical habitat for this species, the removal of 0.91 ha is unlikely to decrease the availability of habitat to the extent that the species is likely to decline.

7. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

*Predation by cats and foxes, particularly in areas where dingoes are excluded, and competition for food and habitat from the introduced house mice (*Mus domesticus*) and rabbits (*Oryctolagus cuniculus*) are both listed as threats to the Dusky Hopping-mouse (DEWHA 2008). The Modification is unlikely to result in an increase in the abundance of cats, foxes, house mice or rabbits, however their numbers would currently be well established in the locality and an existing threat to small native fauna.*

8. introduce disease that may cause the species to decline

There are no known documented diseases that are currently contributing to the decline of the species. The Modification is not expected to cause an increased risk of any diseases that would impact the Dusky Hopping-mouse.

9. interfere substantially with the recovery of the species.

There is no adopted or made recovery plan for this species. Relevant priority actions listed in the approved conservation advice (DEWHA 2008) include:

- Habitat Loss, Disturbance and Modification
 - Identify sites of high conservation priority.
 - Manage threats to areas of native vegetation containing populations of the Dusky Hopping-mouse.
- Animal Predation and Competition
 - Implement appropriate management recommendations outlined in the threat abatement plans for the control and eradication of feral cats, foxes and rabbits in the local region.
 - Develop and implement a management plan for the control and eradication of house mice in the local region.
- Conservation Information
 - Raise awareness of the Dusky Hopping-mouse within the local community.
- Enable recovery of Additional Sites and/or Populations
 - Investigate options for linking, enhancing or establishing additional populations.

The Modification would not interfere substantially with any of the actions listed within the approved conservation advice.

Conclusion: The removal of 0.91 ha of a typical and degraded habitat as part of the Modification is unlikely to have a significant impact on the Dusky Hopping-mouse.

References

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Approved Conservation Advice for Notomys fuscus* (Dusky Hopping-mouse). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from:

<http://www.environment.gov.au/biodiversity/threatened/species/pubs/125-conservation-advice.pdf>.

Klöcker, U.S. (2009). *Management of the terrestrial small mammal and lizard communities in the dune system of Sturt National Park, Australia: Historic and contemporary effects of pastoralism and fox predation*. Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy School of Biological, Earth and Environmental Sciences, The University of New South Wales, Sydney, Australia.

NSW Scientific Committee (NSW SC) (2004). Dusky hopping-mouse (*Notomys fuscus*) - endangered species listing – final determination. Available from: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/dusky-hopping-mouse-notomys-fuscus-endangered-species-listing>.

Val J., Mazzer T., Shelly D. (2012). A new record of the Dusky Hopping-mouse (*Notomys fuscus*) in New South Wales. *Australian Mammalogy* **34**: 257-259.

Annex 7. EPBC Act Referral decision notice



Notification of

REFERRAL DECISION – not controlled action

Broken Hill Battery Energy Storage System Project, Broken Hill, NSW, (EPBC 2021/8918)

This decision is made under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Proposed action

Person proposing to take the action	AGL Energy Limited ACN: 115 061 375
--	--

proposed action	To construct and operate a Battery Energy Storage System (BESS), as well as the installation of a transmission connection from the BESS to the nearby TransGrid substation, approximately 4.5 km south-east of Broken Hill, NSW; as described in the referral received by the Department on 8 April 2021 (see EPBC Act referral 2021/8918).
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Referral decision: Not a controlled action

status of proposed action	The proposed action is not a controlled action.
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Person authorised to make decision

Name and position	Louise Vickery Assistant Secretary Environment Assessments NSW and ACT Branch
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signature

date of decision	7 May 2021
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Annex 8. Ecosystem and species credits required (BAM-C Credit report) for the Modification

Proposal Details

Assessment Id 00018659/BAAS18054/22/00033257	Proposal Name Broken Hill Battery Storage - Whole Area	BAM data last updated * 24/11/2021
Assessor Name Stephen Bloomfield	Report Created 03/06/2022	BAM Data version * 50
Assessor Number BAAS18054	BAM Case Status Finalised	Date Finalised 03/06/2022
Assessment Revision 0	Assessment Type Major Projects	

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Ecosystem credits
Bluebush shrubland on stony rises and downs in the arid and semi-arid zones												
1	155_Low	Not a TEC	21.9	21.9	0.9	PCT Cleared - 50%	High Sensitivity to Potential Gain			1.75		9

2	155_Mode rate	Not a TEC	66.6	66.6	0.01	PCT Cleared - 50%	High Sensitivity to Potential Gain			1.75		1
										Subtotal	10	
										Total	10	

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAll	Species credits	
<i>Ardeotis australis / Australian Bustard (Fauna)</i>										
155_Low		21.9	21.9	0.9		Endangered	Not Listed	False	10	
155_Moderate		66.6	66.6	0.01		Endangered	Not Listed	False	1	
									Subtotal	11



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS18054/22/00033257	Broken Hill Battery Storage - Whole Area	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Stephen Bloomfield	BAAS18054	50
Proponent Names	Report Created	BAM Case Status
	03/06/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Major Projects	03/06/2022

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

BAM Biodiversity Credit Report (Like for like)

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	Not a TEC	0.9	0	10	10

BAM Biodiversity Credit Report (Like for like)

155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Gibber Chenopod Shrublands This includes PCT's: 155, 156	Gibber Chenopod Shrublands >=50% and <70%	155_Low	No		9
Gibber Chenopod Shrublands This includes PCT's: 155, 156	Gibber Chenopod Shrublands >=50% and <70%	155_Moderate	No		1	Barrier Range, Barrier Range Outwash and Strzelecki Desert. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Ardeotis australis / Australian Bustard	155_Low, 155_Moderate	0.9	11.00

Credit Retirement Options

Like-for-like credit retirement options



BAM Biodiversity Credit Report (Like for like)

Ardeotis australis / Australian Bustard	Spp	IBRA subregion
	Ardeotis australis / Australian Bustard	Any in NSW

Proposal Details

Assessment Id 00018659/BAAS18054/22/00033257	Proposal Name Broken Hill Battery Storage - Whole Area	BAM data last updated * 24/11/2021
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List of Species Requiring Survey

Name	Presence	Survey Months
<i>Acacia notabilis</i> Mallee Golden Wattle	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Ardeotis australis</i> Australian Bustard	Yes (assumed present)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Swainsona flavicarinata</i> Yellow-Keeled Swainsona	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

BAM Candidate Species Report

<p><i>Swainsona murrayana</i> Slender Darling Pea</p>	<p>No (surveyed) *Survey months are outside of the months specified in Bionet.</p>	<p> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months? </p>
<p><i>Swainsona viridis</i> Creeping Darling Pea</p>	<p>No (surveyed)</p>	<p> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months? </p>

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barrier Range Dragon	<i>Ctenophorus mirrityana</i>	Habitat constraints
Crowned Gecko	<i>Lucasium stenodactylum</i>	Habitat degraded Species is vagrant
Little Eagle	<i>Hieraaetus morphnoides</i>	Habitat constraints
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	Habitat constraints
Showy Indigo	<i>Indigofera longibractea</i>	Habitat constraints
Stimson's Python	<i>Antaresia stimsoni</i>	Habitat constraints
Thick-billed Grasswren (north-west NSW subspecies)	<i>Amytornis modestus obscurior</i>	Habitat degraded Species is vagrant

Proposal Details

Assessment Id 00018659/BAAS18054/22/00033257	Proposal Name Broken Hill Battery Storage - Whole Area	BAM data last updated * 24/11/2021
Assessor Name Stephen Bloomfield	Report Created 03/06/2022	BAM Data version * 50
Assessor Number BAAS18054	Assessment Type Major Projects	BAM Case Status Finalised
Assessment Revision 0		Date Finalised 03/06/2022

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Bolam's Mouse	Pseudomys bolami	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Dusky Hopping-mouse	Notomys fuscus	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Dusky Woodswallow	Artamus cyanopterus cyanopterus	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Flock Bronzewing	Phaps histrionica	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Forrest's Mouse	Leggadina forresti	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Grey Falcon	Falco hypoleucos	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Kultarr	Antechinomys laniger	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Little Eagle	Hieraetus morphnoides	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones

Little Pied Bat	<i>Chalinolobus picatus</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Long-haired Rat	<i>Rattus villosissimus</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Pied Honeyeater	<i>Certhionyx variegatus</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Redthroat	<i>Pyrrholaemus brunneus</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Ringed Brown Snake	<i>Pseudonaja modesta</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Rufous Fieldwren	<i>Calamanthus campestris</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Sandy Inland Mouse	<i>Pseudomys hermannsburgensis</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Spotted Harrier	<i>Circus assimilis</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Stripe-faced Dunnart	<i>Sminthopsis macroura</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Wedgesnout Ctenotus	<i>Ctenotus brooksi</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
White-fronted Chat	<i>Epthianura albifrons</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
Woma	<i>Aspidites ramsayi</i>	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
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Annex 9. Digital files created for the BDAR

The following shapefiles have been submitted to the ROG South West Region Mailbox at rog.southwest@environment.nsw.gov.au:

- Approved overhead transmission line
- Approved transmission line pole locations
- Australian Bustard species polygon
- BAM plots
- Habitat features
- Modification area
- Modification area disturbance footprint
- Offset requirements
- Plant community types
- Preliminary survey tracks
- RDPSs
- Subject area
- Subject area 1500m buffer
- Substation site
- Swainsona targeted survey tracks.

Contact Us

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Sydney
Brisbane
Cairns
Port Macquarie
Illawarra
Coffs Harbour
Central Coast
Gold Coast
Canberra



Our services

Ecology and biodiversity

Terrestrial
Freshwater
Marine and coastal
Research and monitoring
Wildlife Schools and training

Heritage management

Aboriginal heritage
Historical heritage
Conservation management
Community consultation
Archaeological, built and landscape values

Environmental management and approvals

Impact assessments
Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)