



Broken Hill Battery Energy Storage System

Modification Report

22 Feb 2022

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Modification Report

Client: AGL Macquarie Pty Ltd

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Declaration

This Modification Report has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*.

Environmental assessment prepared by

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Applicant and land details

Applicant	AGL Macquarie Pty Ltd
Applicant address	Level 24, 200 George Street, Sydney NSW, 2000
Proposal	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 Transgrid 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.
Land to be developed	The modification would cross two land parcels (referred here within as the "modification area"): - Lot 7302 DP 1181129 - Lot 2 DP 1102040 (the substation site).

Declaration

I certify that the contents of the Modification Report, to the best of my knowledge, has been prepared as follows:

- In accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*
- In accordance with the requirements of the *Environmental Planning and Assessment Regulations 2000*; and *State Environmental Planning Policy (State and Regional Development) 2011*;
- The statement contains all available information that is relevant to the environmental assessment of the proposed development; and
- The information contained in this report is neither false nor misleading.

Signature:



Date: 22nd February 2022

Name: William Miles

Table of Contents

Declaration	i
Executive Summary	v
1.0 Introduction	1
1.1 Overview	1
1.2 The proponent	1
1.3 Need and alternatives	2
1.3.1 Background and need	2
1.3.2 Objectives of the modification	2
1.3.3 Alternatives	2
1.4 Section 4.55(2) modification	3
1.5 Purpose of this report	4
2.0 Site location and context	7
2.1 Modification area	7
2.2 Site context	7
2.2.1 History of the modification area	7
2.2.2 Description of the surrounding area	7
2.2.3 Surrounding land uses	8
2.3 Modification area description	8
2.3.1 Access	8
2.3.2 Topography, geology, soils, groundwater, and surface water	8
3.0 Approved project	9
3.1 Approved project overview	9
3.2 Transmission connection	11
4.0 Modification	13
4.1 Modification overview	13
4.2 Transmission connection construction	19
4.2.1 Construction methodology	19
4.2.2 Materials, stockpiling and laydown areas	20
4.2.3 Construction program	20
4.2.4 Construction equipment	20
4.2.5 Workforce	20
4.2.6 Construction hours	21
4.2.7 Construction traffic, parking and access	21
4.2.8 Operation	21
4.3 Consolidated project description	21
5.0 Strategic and statutory context	22
5.1 Strategic context	22
5.2 Statutory Context	22
5.2.1 Environmental Planning and Assessment Act 1979	22
5.2.2 Environmental Planning and Assessment Regulation 2000	24
5.2.3 State Environmental Planning Policies	25
5.2.4 Broken Hill Local Environmental Plan 2013	26
5.2.5 Broken Hill Development Control Plan 2016	27
5.2.6 Draft environmental planning instruments	27
5.2.7 Voluntary planning agreements	27
5.2.8 Other NSW legislation	28
5.2.9 Commonwealth legislation	31
6.0 Consultation	33
6.1 Consultation objectives	33
6.2 Community and stakeholder engagement	33
6.3 Consultation activities undertaken to date	34
6.3.1 Government and non-Government consultation	34
7.0 Environmental assessment	37
7.1 Environmental Scoping	37
7.1.1 Assessment approach	37
7.1.2 Summary of potential issues identified	37

7.2	Biodiversity	38
7.2.1	Methodology	38
7.2.2	Existing environment	38
7.2.3	Impact assessment	43
7.2.4	Mitigation and management measures	47
7.3	Aboriginal Heritage	47
7.3.1	Methodology	47
7.3.2	Existing environment	48
7.3.3	Impact assessment	49
7.3.4	Mitigation and management measures	49
7.4	Soils, groundwater and contamination	49
7.4.1	Methodology	49
7.4.2	Existing environment	50
7.4.3	Construction impact assessment	50
7.4.4	Operation impact assessment	51
7.4.5	Mitigation and management measures	51
7.5	Surface water, flooding and water use	51
7.5.1	Methodology	51
7.5.2	Existing environment	52
7.5.3	Construction impact assessment	52
7.5.4	Operation impact assessment	53
7.5.5	Mitigation and management measures	53
7.6	Other matters	54
7.6.1	Non-Aboriginal Heritage	54
7.6.2	Noise and Vibration	55
7.6.3	Transport and access	57
7.6.4	Bushfire	58
7.6.5	Visual impact	59
7.6.6	Social and economic	60
7.6.7	Waste	61
7.6.8	Air quality	61
7.6.9	Cumulative impacts	62
8.0	Conditions of Consent	63
9.0	Management and mitigation measures	71
9.1	Management and mitigation measures	71
9.2	Construction Environmental Management Plan	81
9.3	Operation Environmental Management	81
10.0	Evaluation and justification	82
10.1	Ecologically sustainable development	82
10.1.1	The principles	82
10.1.2	Precautionary principle	82
10.1.3	Inter-generational equity	83
10.1.4	Conservation of biological diversity and ecological integrity	83
10.1.5	Improved valuation and pricing of environmental resources	83
10.1.6	Compatibility with the Principles of ESD	83
10.2	Objects of the Environmental Planning and Assessment Act 1979	84
10.3	Project Justification	85
11.0	References	86
Appendix A		A
	Consolidated Project Description	
Appendix B		B
	Biodiversity Development Assessment Report	
Appendix C		C
	Aboriginal Cultural Heritage Assessment Report	

List of Figures

Figure 1-1	Regional context	6
Figure 3-1	Approved project	12
Figure 4-1	Modification	17
Figure 4-2	Comparison between approved Project and the proposed modification	18

List of Tables

Table 1-1	Change to proponent details	2
Table 1-2	Modification Report Requirements (DPIE, 2021)	5
Table 3-1	Details of the approved Project	9
Table 4-1	Modified project summary table	13
Table 4-2	Indicative Program	20
Table 5-1	Matters of Consideration under section 4.15(1) of the EP&A Act	23
Table 5-2	Modification Report statutory requirements	24
Table 5-3	MNES within 10 km of the Site	31
Table 6-1	Government Agencies and Non-Government stakeholders consultation summary	35
Table 7-1	Prioritisation of environmental matters	37
Table 7-2	Landscape features	38
Table 7-3	Candidate threatened fauna species with the potential to occur or require further survey	40
Table 7-4	List of predicted and candidate threatened species for the modification area	42
Table 7-5	Assessment of direct impacts relevant to construction of the modified Project	44
Table 7-6	Assessment of indirect impacts relevant to construction of the modified Project	45
Table 7-7	Assessment of direct and indirect impacts relevant to construction of the modified Project	46
Table 7-8	Biodiversity offset credit obligation	47
Table 7-9	Site search results (10 x 10 km area)	48
Table 7-10	Historic heritage register and list searches	54
Table 7-11	Rating background levels (RBL)	56
Table 7-12	Transmission connection construction equipment	56
Table 7-13	Broken Hill Ambient Monitoring Data Summary	62
Table 8-1	Relevant conditions of consent review	63
Table 9-1	Management and mitigation measures	71
Table A-1	Consolidated project description	A-1
Table A-2	Infrastructure services	A-4
Table A-3	Indicative construction schedule	A-7
Table A-4	Likely plant and equipment required for construction	A-7
Table A-5	Indicative plant and equipment for operation	A-9

Executive Summary

Overview

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.

Modification

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 Transgrid Broken Hill substation. Similar to the approved transmission connection, 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.

The modification is capable of being consented under section 4.55(2) of the EP&A Act as the revised transmission connection:

- Falls within the description of the development consented under SSD-11437498.
- Does not propose a separate and/or distinct use.
- Is “*essentially and materially substantially the same development*”, as that approved by the development consent for SSD 11437498.
- Will only result in physical changes that, whilst in some cases are different, are, at most, relatively minor when compared to the approved Project.

The modification is consistent with the approved Project as it allows for the safe delivery of the transmission connection between the BESS and the substation site. Therefore, it can be concluded that the Project would remain “*substantially the same development as the development for which the consent was originally granted*”. On this basis, AGL is seeking to modify the development consent for SSD-11437498, pursuant to s.4.55(2) of the EP&A Act.

Consultation

Stakeholder engagement has been largely targeted to keeping adjoining property owners and tenants and local stakeholders informed of the assessment process and anticipated modification such that queries can be identified and mitigated throughout the project planning. A summary of the consultation with relevant stakeholders is presented in **Table 6-1**. Where relevant, a cross reference to where the matter has been addressed in the Modification Report is also provided.

Environmental assessment

Biodiversity

A Biodiversity Development Assessment Report (BDAR) has been prepared for the modification. This assesses impacts as a result of the modification in accordance with both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The modification would affect biodiversity through both direct and indirect impacts during construction. The majority of impacts on biodiversity would occur during construction from clearing of native vegetation and removal of habitat for a limited range of flora and fauna. Direct impacts are proposed to be mitigated primarily through project design, as well as management and mitigation measures.

Construction of the modification would involve the removal of approximately 0.59 ha of low condition native vegetation (PCT 155) and 0.01 ha moderate condition native vegetation (PCT 155) occurring along the transmission connection which has a buffer of approximately 20 metres. This is a worst-case scenario and all vegetation within the corridor would not require removal.

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.

No threatened biodiversity at risk of Serious and Irreversible Impacts are known or considered likely to occur in the modification area.

A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the modification has been undertaken using the Biodiversity Assessment Method Calculator and is shown in **Section 7.2.3**.

Aboriginal heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been undertaken for the modification to identify the Aboriginal cultural heritage values of the modification area and to assess the potential impact of the modification on identified Aboriginal cultural heritage values. The ACHAR involved consultation with Aboriginal stakeholders and conducting an archaeological survey of the modification area.

The survey within the modification area identified a total of 11 Aboriginal artefacts scattered over an area roughly 5 m x 2 m in size. These artefacts are considered to comprise a single artefact scatter site. No Aboriginal artefacts were identified during the subsurface excavation program.

To mitigate the impact of the proposed works, it is recommended that all surface artefacts present within the boundary of the artefact scatter site be relocated to an area nearby that would not be impacted by the modification. Artefact relocation would be undertaken by a qualified archaeologist and appropriate number of Registered Aboriginal Parties (RAP) field representatives with the RAPs determining the final artefact location.

Management and mitigation measures would be implemented to manage impacts to previously unidentified Aboriginal objects, should they be encountered.

Soils, groundwater and contamination

To support the application for the modification, a desktop assessment of the modification area was completed to understand the existing ground conditions and the likely level of assessment required. Information within Chapter 11.0 of the EIS was also referenced to support this assessment.

Ground disturbance

Installation of the transmission connection below ground would involve the excavation and stockpiling of soil. This soil is likely to be used as backfill at the broad location where it is excavated; however, it may need to be transported within the modification area. If not adequately managed, earthworks, stockpiling and transportation of spoil could potentially have the following impacts:

- Erosion of exposed soil and stockpiled materials.
- An increase in sediment loads entering the drainage line within the modification area.
- Dust generation from excavation and vehicle movements over exposed soil.

There is a low risk of encountering acid sulfate soils during the undergrounding of the transmission connection given that the probability of acid sulfate soils in the area is low.

The approved Project considered potential impacts related to earthworks, stockpile management and erosion and sediment control. The mitigation measures identified for the approved project remain appropriate to manage the potential impacts related to the trenching activities. Specifically, the management of ground disturbance impacts would be managed through the preparation and implementation of a Soil and Water Management Plan (SWMP), which would include the mitigation measures identified in this report.

Soils and contamination

The modification area is located on land that has not previously been developed. Desktop investigations completed for the approved Project suggested that it was unlikely that contamination would be present along the route of the transmission connection. Nevertheless as a precaution, sampling would be undertaken for excavations along the transmission connection to allow for waste classification. The Construction Environment Management Plan (CEMP) for the modified Project would include a measure to address unexpected finds of contamination. Accidental spills and leaks of fuels and oils from plant and equipment during construction would also be managed through the CEMP.

Groundwater

Given that ground disturbance works could be up to 1.3 m below ground level to allow for the transmission connection across the modification area, it is unlikely that groundwater would be intercepted during construction. Therefore, the proposed construction works are not anticipated to result in impacts to groundwater.

Surface water, flooding and water use

A surface water, flooding and water use assessment was prepared to support the development application and EIS for the approved Project. The purpose of this assessment was to determine the potential surface water, flooding and water use impacts during construction and operation of the approved Project. To support the application for the modification, a desktop assessment was completed to understand the existing surface water and flooding conditions for the modification area and the likely potential impacts of the modification.

The option of installing the transmission connection belowground would require the cables to be placed in an excavated trench. The excavation would be a maximum of 1.3 m deep and 1.0 m wide (depending on the location). Soil would be excavated and stored close to the trench before being used as backfill. The trench would be excavated and backfilled progressively.

There are two main surface water impacts that could result from the trenching and related activities. These potential impacts would be temporary and limited to the installation of the transmission connection. These include:

1. Impacting the quality of water within the watercourse and downstream receptors
2. Obstructing or altering flow paths with, for example, excavations, construction equipment, materials or temporary stockpiles.

A number of mitigation and management measures were identified as part of the approved Project. These measures provided mitigation approaches for the management of spills, erosion and sediment control and surface water flow diversions. In particular, a measure to produce a Surface Water

Management Plan (SWMP) in accordance with *Managing Urban Stormwater: Soils and construction – Volume 1* (the Blue Book) (Landcom, 2004) was agreed. Trenching across the modification area was not considered as part of the approved Project. Therefore, additional measures have also been identified to mitigate potential impacts and would be included in the SWMP.

Other matters

Other matters considered as ‘low risk’ due to the nature of the modification were assessed as part of the Modification Report. These other aspects included non-Aboriginal heritage, noise and vibration, transport and access, bushfire, social and economic, waste, air quality and cumulative impacts.

The findings from these assessments concluded that:

- **Non-Aboriginal Heritage** – An updated desktop search of relevant historic heritage registers was undertaken which identified one item, the City of Broken Hill, as being relevant to the modification. The modification would not result in direct impacts to heritage values and significant elements of the City of Broken Hill. No additional heritage items are within or in the immediate vicinity of the modification area.
- **Noise and Vibration** - A Noise and Vibration Impact Assessment (NVIA) was prepared to support the development application and EIS for the approved Project. The NVIA was used to determine the potential noise impacts the modification may have on surrounding receivers. The modification is expected to comply with the noise management levels at the residential receivers given their distance from the works and the proposed construction equipment. The construction works associated with the modification are not expected to result in noise levels, which would exceed the ‘highly noise affected’ level of 75 dB(A) for residential receivers. For non-residential receivers, the original assessment as presented in the EIS remains consistent in that one exceedance within the 11-20 dB band at the Transgrid substation during the transmission connection phase is predicted. Works to complete the revised transmission connection would progressively move along the transmission connection. Transgrid would be consulted to help manage potential noise impacts. Potential construction noise and vibration impacts of the modification would be limited and manageable with the implementation of standard and previously approved mitigation measures.
- **Transport and Access** - A Traffic and Access Impact Assessment (TAIA) was prepared to support the development application and EIS for the approved Project. The TAIA was used to determine the potential traffic impacts that may arise as a result of the modification. Similar to the original assessment as presented in the approved EIS, the installation of the transmission connection belowground would not generate additional traffic or create additional access impacts to that assessed in the EIS. During construction, vehicles would continue to access the modification area, including the substation site from Pinnacles Road. The maximum vehicle numbers required for the modification are not anticipated to exceed the numbers as presented in the approved EIS. Management of potential impacts to traffic related impacts would remain consistent with the approved Project.
- **Bushfire** - A Bushfire Threat Assessment (BTA) was prepared to support the development application and EIS for the approved Project. During construction of the modification, construction equipment and vehicles may have the potential to create a fire risk through the generation of sparks or heat, or machinery faults, which may ignite dry combustible material, if present. Other potential sources of ignition may arise from accidental fires from human related activities. This would be largely avoided through appropriate use of equipment and machinery within the modification area. The risk of bushfire impact to the modification area and fire initiating and spreading from the modification area has been assessed as low. Notwithstanding, bushfire protection measures would be implemented to address residual risks, minimise bushfire impact on the proposed assets, and help implement a ‘measures in combination’ approach as required by *Planning for Bush Fire Protection 2019*.
- **Visual** – The modification would be visually compatible with the surrounding industrial area. Construction activities and equipment would be temporarily visible to road users using Pinnacles Road. Construction vehicles may also be seen accessing the modification site via Pinnacles Place. Due to the temporary nature of the construction activities and the transient nature of passing receptors, the significance of visual impacts would be low. The potential undergrounding of the transmission connection would mean that this part of the Project would result in no visual impacts

during operation. No additional management and mitigation measures are proposed outside what has been identified for the approved Project.

- **Social and economic** – The Project has the potential to affect amenity as a result of changes to aspects such as traffic, noise, air quality and the visual environment. These impacts were assessed in the EIS and appropriate management and mitigation measures identified. The modification would not affect the conclusions of this assessment.
- **Waste** – With the implementation of management and mitigation measures, it is not anticipated that operational waste management activities for the modification would pose a significant risk to the environment or human health. A Construction Waste Management Plan would be prepared and implemented as part of the CEMP for the Project to manage wastes produced during construction.
- **Air quality** – taking into consideration the temporary nature of the works, the location of the modification area within an industrial zone, and the distance to residential receivers, air quality impacts during the construction phase are not considered to be significant and would be managed through the application of the mitigation measures agreed as part of the approved Project. These mitigation measures remain applicable to the modification.
- **Cumulative impacts** – Although some projects have been identified as having the potential to result in cumulative impacts if constructed concurrently or consecutively with the modified Project, the construction timeframes of these projects have not been confirmed. Despite this, taking into consideration the residual environmental impacts of the modification (following the implementation of management and mitigation measures), there would be limited potential for cumulative environmental impacts to occur.

Conclusion

The Modification Report provides an appropriate assessment of the modification and its relevant potential environmental, social and economic effects. Potential impacts have been assessed and strategies to avoid, minimise and mitigate those impacts form a key part of the modification. This Modification Report includes a number of commitments to manage the potential impacts that may occur during the construction and operation of the modification. As part of the approved Project, the modification would deliver several benefits. In particular, the modified 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.

The modification to development consent SSD-11437498 is considered to be of minor environmental impact, given the extent of changes proposed to the approved Project. The development as modified is substantially the same as the original development consent. This Modification Report has concluded that the modification works should proceed as 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.

On the basis of the discussion within this Modification Report, the modification is considered to be justified.

1.0 Introduction

1.1 Overview

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 **Chapter 2.0 Site location and context**). 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. 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).

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. Details of the modification are provided in **Chapter 4.0 Modification**.

1.2 The proponent

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 National Energy Market (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 this 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 Change to 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	Jonathan Ambler
Position	Deputy Project Manager	Director Power Development and Value Studies

1.3 Need and alternatives

1.3.1 Background and need

The electricity sector is in the process of significant change. As the market moves away from coal, emerging technologies such as battery storage, are increasingly needed to facilitate the transition to renewable energy generation by allowing electricity to be dispatched to the grid as needed. AGL currently operates the 53 MW Broken Hill Solar Plant and the 200 MW Silverton Wind Farm which both connect to the Transgrid Broken Hill substation.

Over the past decade, there has been a progressive increase in installed renewable generators within the NEM. Renewable generation (in particular wind and solar) is intermittent in nature, generating electricity only when wind and solar resources are available. The need for storage capacity is expected to increase in the next 20 years, in line with the progressive retirement of thermal generators from the NEM. The approved Project will provide storage and firming capacity to the NEM, as well as additional services to assist grid stability including frequency control ancillary services.

Following the approval of SSD-11437498, Transgrid requested AGL modify the connection location at their substation to a revised location further to the north-west on the substation site. In order to accommodate Transgrid's request, AGL is required to modify the transmission connection between the approved BESS site and the substation site. As such, the modification involves seeking development consent for the option of undergrounding the transmission connection between the BESS and the substation site along a revised transmission alignment.

1.3.2 Objectives of the modification

The works required to modify the location and construction approach for the transmission connection would not change the objectives or purpose of the approved Project as presented in the EIS. These objectives as presented in Section 1.2 of the approved EIS are:

- Provide firming capability to existing renewable projects in the Broken Hill region and throughout the 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.

Securing development consent for the modification is imperative to ensure the approved Project contributes to the storage requirements identified in the Integrated System Plan (ISP) (AEMO, 2020). As such, the modification is required to deliver on the approved Project objectives.

1.3.3 Alternatives

Two project options were considered by AGLM to inform this modification, which included:

- Option one (1): a base case, or 'do nothing' approach

- Option two (2): Revised transmission connection - construct the transmission connection above or belowground (in part or in full) via a revised alignment.

Each option that was considered is discussed in further detail below.

Option 1 – Do nothing approach

The ‘do nothing’ option would involve constructing the aboveground transmission connection in accordance with the approved Project. However, as indicated in **Section 1.1** and **Section 1.3.1**, Transgrid requested the alignment to be revised to accommodate a more viable connection to the substation site. On this basis, the ‘do nothing’ approach may result in the BESS being unable to connect to the substation site. The ‘do nothing’ option would not meet the objectives of the Project, and therefore, was not considered a feasible option.

Option 2 – Revised transmission connection

In order to accommodate Transgrid’s request, AGLM is required to modify the transmission connection between the approved BESS site and the substation site. This option would involve the construction of a transmission connection via a revised alignment to facilitate connection to the substation site.

Given the existing infrastructure surrounding the substation site, the revised transmission connection would require the option to be constructed either above or belowground (in part or in full). This Modification Report has included an investigation of the likely impacts associated with the construction of the transmission connection either above or belowground (in part or in full) (refer to **Section 7.0**). Based on this investigation, the transmission connection would be constructed to minimise the environmental impact as far as practicable.

This option would facilitate the required connection between the BESS and substation site, in light of Transgrid’s request. On this basis, Option 2 is considered the preferred option.

1.4 Section 4.55(2) modification

AGL is seeking to modify the consent for SSD-11437498 to allow for the option of undergrounding the connecting transmission connection in part or in full and allow for the transmission connection to be constructed along a revised alignment to connect to a busbar in the north-west section of the substation site. This Modification Report has been prepared to support the modification of the transmission connection (refer to **Chapter 4.0 Modification**).

The limits regarding modifications to development consents are outlined in section 4.55 of the EP&A Act. This section of the EP&A Act provides three pathways for modification applications:

- Section 4.55(1) – modifications involving minor error, misdescription, or miscalculation
- Section 4.55 (1A) – modifications involving minimal environmental impact
- Section 4.55 (2) – other modifications

Given the anticipated impacts associated with the modification, AGL is seeking to modify development consent SSD-11437498 under section 4.55(2) of the EP&A Act.

Section 4.55(2) of the EP&A Act states that a consent authority may allow the modification of a development consent if “*it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all)*”. The leading guidance on the substantially the same test is *Vacik v Penrith City Council* [1992] NSWLEC 8 (**Vacik**) and *Moto Projects (No 2) Pty Ltd v North Sydney Council* (1999) 106 LGERA 298 (**Moto**). In *Vacik*, Stein J held that the term “substantially” means “essentially have the same essence”.

In *Moto*, Bignold J set out the following principles for consideration in satisfying the precondition of substantially the same:

- a. “The requisite factual finding obviously requires a comparison between the development, as currently approved, and the development as proposed to be modified...” (at [55]).
- b. “The result of the comparison must be a finding that the modified development is ‘essentially or materially’ the same as the (currently) approved development” (at [55]).

- c. *The comparative task involves a quantitative as well as qualitative appreciation of the differences - a numeric or quantitative evaluation of the modification when compared to the original consent absent any qualitative assessment will be “legally flawed” (at [52]).*
- d. *“The comparative task does not merely involve a comparison of the physical features or components of the development as currently approved and modified where that comparative exercise is undertaken in some type of sterile vacuum. Rather, the comparison involves an appreciation, qualitative, as well as quantitative, of the developments being compared in their proper contexts (including the circumstances in which the development consent was granted)” (at [56]).*
- e. *The comparative task needs to assess the physical features as well as the environmental impacts of the changes (at [57]-[62]).*
- f. *Consideration should be given to any feature of the development, which is important, material or essential. A change to such a feature is likely to mean that it is not substantially the same development (at [64]).*

The successful development of the Project requires a transmission connection between the BESS and the substation site. The SSD application included as part of the Project an overhead transmission connection. AGL is seeking to modify development consent SSD-11437498 to allow for the construction of the transmission connection within a revised corridor alignment by belowground or overhead connection.

The modification is capable of being consented under section 4.55 of the EP&A Act as the revised transmission connection:

- Falls within the description of the development consented under SSD-11437498.
- Does not propose a separate and/or distinct use
- Is “*essentially and materially substantially the same development*”, both from a qualitative and quantitative perspective, as that approved by the development consent for SSD 11437498.
- Will only result in physical changes that are, at most, relatively minor when accounting for the overall operation of the approved Project (refer to **Chapter 7.0 Environmental assessment**).

The modification is consistent with the approved Project as it allows for the safe delivery of the transmission connection between the BESS and the substation site. Therefore, it can be concluded that the Project would remain “*substantially the same development as the development for which the consent was originally granted*”. On this basis, AGL is seeking to modify the development consent for SSD-11437498, pursuant to s.4.55 of the EP&A Act.

Section 4.55(2) applies where a modification will have more than minor environmental impact. As demonstrated within this Modification Report, the modification is likely to result in impacts which are of ‘minimal environmental impact’ (i.e., impacts that are expected to be within the same scale as those that have been previously approved and would result in “very small” or “negligible” overall environmental impacts¹). The relevant management and mitigation measures detailed in the approved Project would continue to apply should the modification be consented.

However, whilst the potential impacts related to the modification works are unlikely to be significant, the works associated with the modification are likely to introduce potential environmental impacts that were not considered in the EIS for the Project. Therefore, given the difference in certain potential impacts, a modification application under s.4.55(2) of the EP&A Act has been progressed.

1.5 Purpose of this report

This Modification Report has been prepared in broad accordance with the NSW Government’s “*State significant development guidelines – preparing a modification report: Appendix E to the state significant development guidelines*” (DPIE, 2021). This guideline provides a detailed explanation of the form and content requirements for modification reports. Pursuant to the *Environmental Planning and Assessment*

¹ King, Markwick, Taylor & Ors v Bathurst Regional Council [2006] NSWLEC 2005

Regulation 2000 (EP&A Regulation), a modification report submitted to DPIE 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 E of the State significant development guidelines has been provided in **Table 1-2**.

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

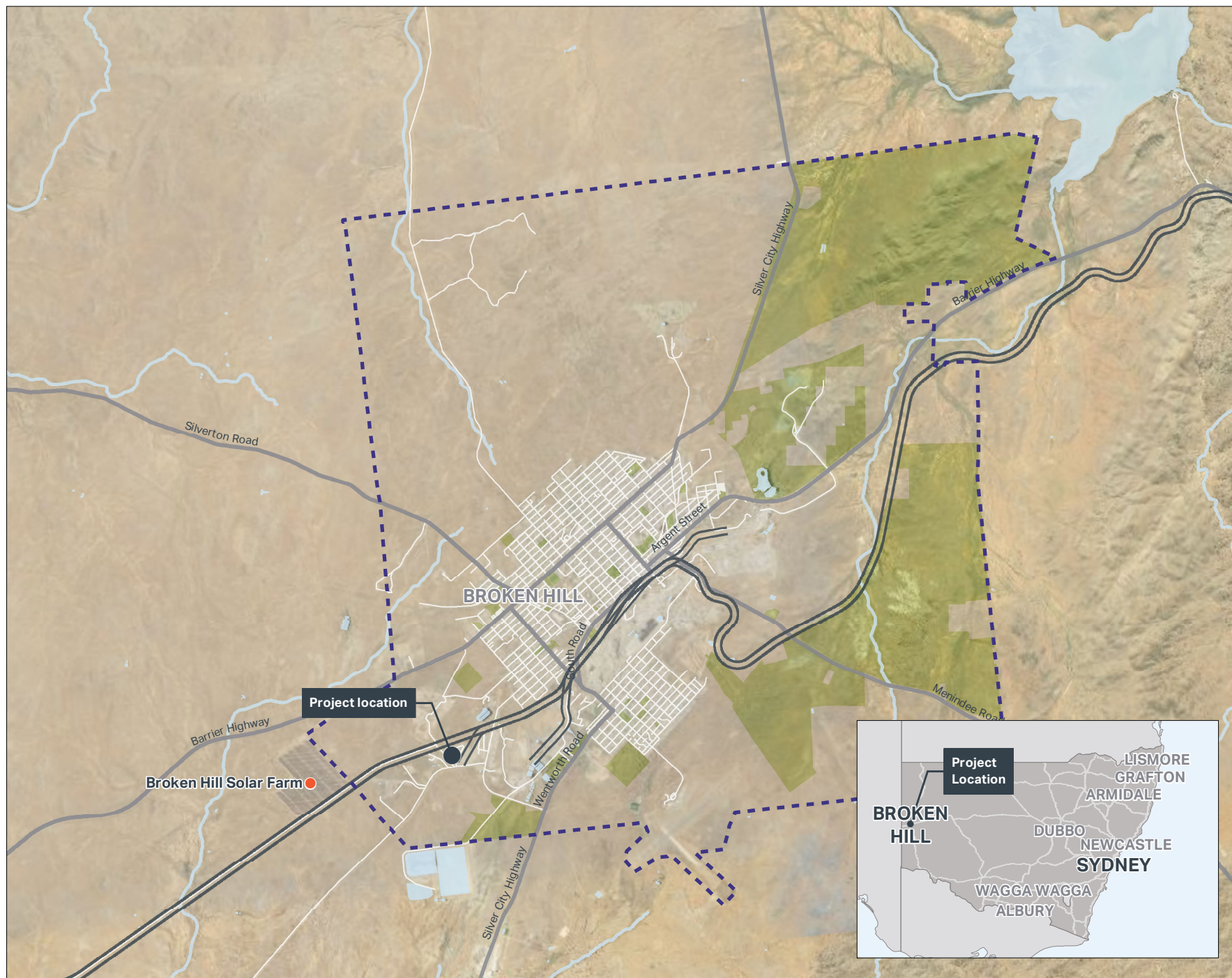
Requirement	Reference
Part 1 - the modification report must contain the following information:	
Introduction	Chapter 1.0 Introduction
Strategic context	Section 5.1
Description of the modification	Chapter 4.0 Modification
Statutory context	Section 5.2
Community engagement	Chapter 6.0 Consultation
Assessment of impacts	Chapter 7.0 Environmental assessment
Justification of the modified project	Chapter 10.0 Evaluation and justification
Part 2 – the following should be provided as part of the Modification Report	
An updated project description, incorporating the proposed modifications	Appendix A Consolidated project description
A statutory compliance table	Section 5.2.1
An updated table of the approved mitigation measures for the project (excluding any measures that form part of the physical design and layout of the project)	Chapter 9.0 Management and mitigation measures
Any supporting information, including any detailed community engagement or technical reports.	• Chapter 6.0 Consultation • Appendix B Biodiversity Development Assessment Report • Appendix C Aboriginal Cultural Heritage Assessment Report



0 1 2 km

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 Site location and context

2.1 Modification area

The modification would cross two land parcels (referred here within as the “modification area”):

- Lot 7302 DP 1181129
- Lot 2 DP 1102040 (the substation site).

2.2 Site context

2.2.1 History of the modification area

The modification area is in the suburb of Broken Hill, which is part of the Broken Hill City Council Local Government Area (LGA). Broken Hill is an inland mining city in the far west of NSW and is located in proximity to the border with South Australia on the crossing of the Barrier Highway (A32) and the Silver City Highway (B79), in the Barrier Range. Broken Hill is considered one of Australia’s boomtowns. Located over 1,100 kilometres west of Sydney and surrounded by semi-desert, the city has prominent park and garden displays.

The city of Broken Hill is prominent in Australia’s mining, industrial relations and economic history after the discovery of silver ore led to several mines in the area.

By the 1920s, most of the mines on the Line of Lode had their own steam-powered electrical generators to power the surface and belowground workings. As Broken Hill is in a desert with little water and virtually no fuel, steam generation was an expensive option. In 1927, a plan for a central power-generating facility was proposed. The proposed powerhouse would provide electricity and compressed air. The mines agreed and formed Western New South Wales Electric Power Pty Ltd to construct and operate the plant. The Sulzer diesel-powered plant was completed in 1931. This was one of the earliest examples of the use of diesel for power generation in Australia.

Despite experiencing an economic decline in the late 1990s and early 2000s, Broken Hill remains Australia’s longest running mining town. This legacy led to the whole Broken Hill LGA being listed on the National Heritage List in 2015.

The land that the modified transmission connection would cross is subject to an undetermined Aboriginal Land Claim (number 40469). The land includes an ephemeral north-south drainage line and an unsealed vehicle track. This land is freehold land that is owned by NSW Government and is classified as Commons, which is administered by Broken Hill City Council. The vegetation surrounding the Transgrid Broken Hill substation compound and within the Commons is in a degraded state, with some patches of moderate to low condition vegetation.

2.2.2 Description of the surrounding area

The modification area is approximately two kilometres west of the city of Broken Hill in a semi-rural/industrial area. Industrial land uses are located adjacent to and around the modification area. Several freight storage and handling yards are located immediately to the east, while rural properties are located to the south and east. Approximately 200 metres to the north is Adelaide-Broken Hill Railway and the Broken Hill Community Recycling Centre.

The 53 MW Broken Hill Solar Plant operated by AGL was completed in 2016 and is located approximately 1.5 kilometres west of the approved Project. At the time of construction, the Broken Hill Solar Plant was one of the largest renewable energy facilities in Australia. In addition, AGL has completed construction of the 200 MW Silverton Wind Farm which is located 20 kilometres north-west of the substation site.

2.2.3 Surrounding land uses

The dominant land use zone within the vicinity of the Site is IN1 General Industrial, which occurs to the north, east, south and west. Other land uses within one kilometre of the modification area include:

- C2 Environmental Conservation
- C4 Environmental Living
- IN1 General Industrial
- RU2 Rural Landscape
- SP1 Special Activities (Mining)
- SP2 Infrastructure (Rail Infrastructure Facility)
- SP2 Infrastructure (Waste Management Facility)
- SP2 Infrastructure (Water Supply System).

An ephemeral drainage line is located within the modification area. The nearest residential property is located approximately 1 kilometre to the south of the modification area and the nearest residential area is located approximately 1.65 kilometres north-east of the modification area along Ryan Street.

2.3 Modification area description

2.3.1 Access

Primary access to the modification area would be from Pinnacles Road, a sealed road located to the south of the Commons Land and the substation site. Pinnacles Road is a local road managed by Broken Hill City Council. Pinnacles Place, a sealed local road managed by Broken Hill City Council, will be used to access the BESS site. Pinnacles Place is also accessed from Pinnacles Road.

2.3.2 Topography, geology, soils, groundwater, and surface water

Topography

The modification area is relatively flat and slopes downwards slightly along a north-west to south-east gradient, from approximately 284 to 282 metres Australian Height Datum (AHD) across a distance of approximately 100 metres.

Geology and soils

According to the 1:250,000 geological sheet, the modification area is located within the Precambrian aged Willyama Complex. The Atlas of Australian Soils indicates that the Site and surrounds are classified as Sodosols soil type.

A review of the Atlas of Australian Acid Sulfate Soils indicates that the modification area and immediate surrounds are categorised as having an extremely low probability (1-5% chance) of acid sulfate soil occurrence.

No naturally occurring asbestos or occurrences of mining subsidence are indicated on or within 500 metres of the modification area.

Surface water and groundwater

The modification crosses one ephemeral watercourse; the upper portion of a 1st order ephemeral tributary of Kelly's Creek. The central channel of Kelly's Creek is located approximately 5.5 kilometres south of the modification area. The channel drains in a southerly direction. It is likely that groundwater also drains in a southerly or south-easterly direction.

A review of the NSW Department of Primary Industries – Office of Water dataset indicates that there are no registered groundwater bores located within the modification area and 13 registered groundwater bores within one kilometre of the Site. Based on the characteristics of these groundwater bores, it was identified that there may be potential for shallow groundwater to be present at the modification area at less than two metres below ground level.

3.0 Approved project

3.1 Approved project overview

The approved Project comprises a BESS with a capacity of approximately 50 MW and up to 100 MWh that would store energy from the grid. Key features of the approved Project are summarised in **Table 3-1**. These features comprise the approved Project, by which development consent was obtained pursuant to SSD-11437498.

Table 3-1 Details of the approved Project

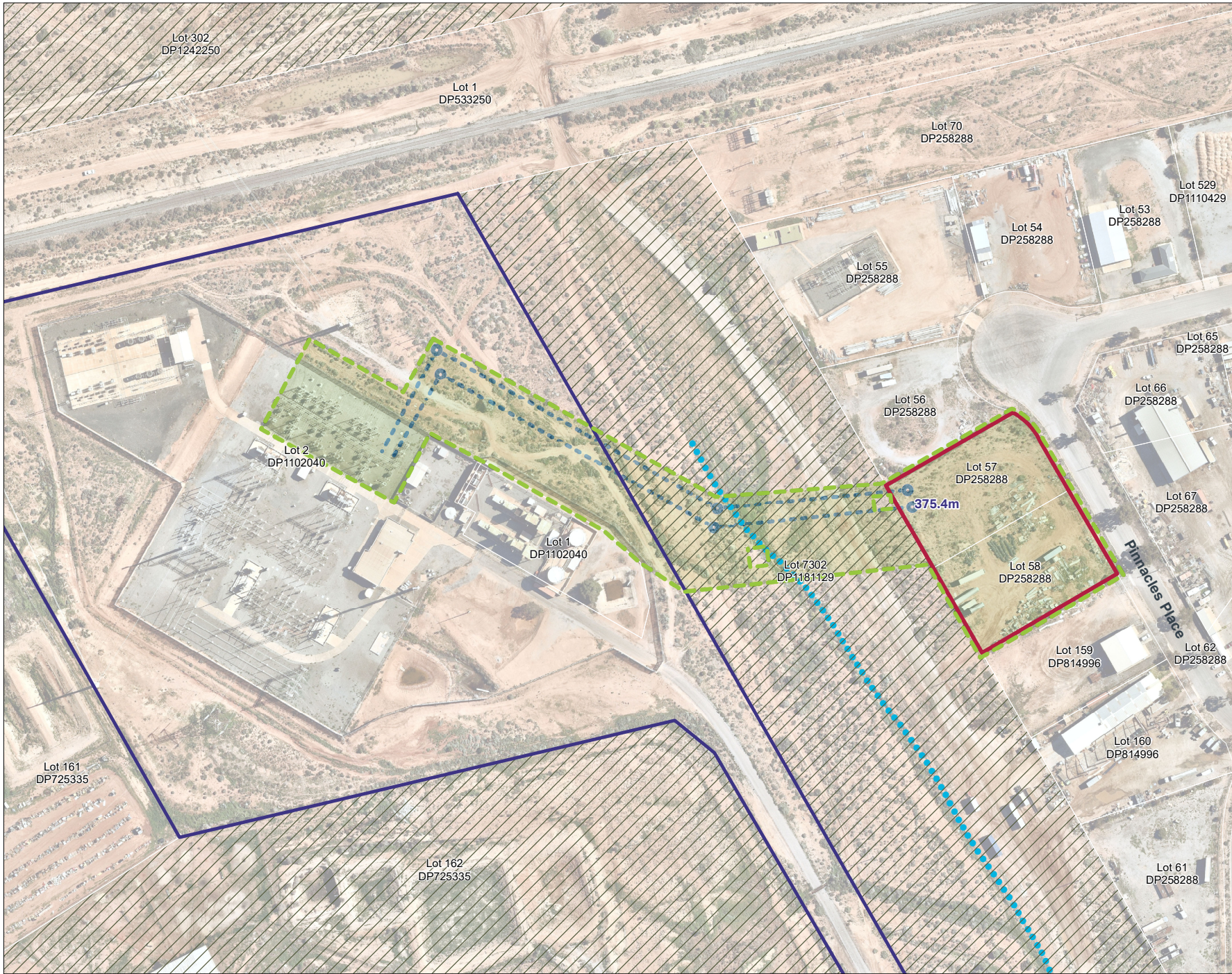
Project	Broken Hill Battery Energy Storage System (BESS)
Key features	- Construction and operation of a BESS with a capacity of approximately 50 MW and up to 100 MWh; and - Connection of the BESS to the nearby Transgrid Broken Hill substation via a 22 kV overhead powerline connecting through a 22 kV busbar at the substation.
Approved development	The approved Project would be generally comprised of the following components: - 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.
Approved Project layout	Refer to Figure 3-1 .
Site description	The proposed location of the BESS site is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). The substation site located at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040). The overhead transmission connection between the BESS site and the substation site would traverse Lot 7302 DP 1181129.
Access	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 (located on Lot 7302 DP 1181129) would be utilised during emergencies.
Grid connection	An above ground 22 kV transmission connection from the Site to the substation site.
Construction	
Construction activities	Construction works would involve: - Enabling works - Civil, Structural, mechanical and electrical works - Commissioning - Demobilisation A construction laydown area will be provided on the Site.

Construction	
Plant and equipment	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: • Enabling works - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: - 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: - Elevated work platforms - Cranes - Generators - Light vehicles. • Demobilisation: - Heavy vehicles including road trucks - Water Trucks - Backhoe - Compactors - Light vehicles. • Maintenance equipment: - Chainsaws - Tractors - Light vehicles - Woodchippers/ mulchers.
Construction duration	Construction of the approved Project is intended to 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	
Construction hours	The construction activities would be primarily carried out during standard construction hours, as defined by the <i>Interim Construction Noise Guideline</i> , being: • 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 approved 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 approved 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 approved 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 approved Project.

3.2 Transmission connection

An above-ground 22 kV transmission connection from the Site to the substation site would be constructed (refer to **Figure 3-1**). It is expected that this line would be approximately 300 metres in length. The proposed transmission connection would require the construction of associated infrastructure, including a transmission connection landing gantry at the BESS site and connections at the substation. A number of supporting structures would be required to carry the 22 kV transmission connection between the substation and the BESS. The supporting structures would be located on the Site, within the substation site and on the land between these two areas (Lot 7302 DP 1181129). The transmission connection would require a corridor across Lot 7302 DP 1181129 (a semi-vegetated open space which includes an unsealed road) and part of the land within which the substation is located.



- Legend**
- BESS Site
 - Transgrid Broken Hill Substation
 - Commons
 - Ephemeral Watercourse
 - Approved Project Area
 - Approved Transmission Line Pole Location
 - Approved Overhead Transmission Line

**FIGURE 3-1:
APPROVED PROJECT**

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Indicative only, subject to detailed design.

Source: Imagery @ Nearmap, 2021

4.0 Modification

4.1 Modification overview

As discussed in **Section 1.1**, 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 Transgrid 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**. A consolidated figure that illustrates the comparison between the approved Project and the proposed modification has been provided as **Figure 4-2**.

Two, 3-phase cables may need to be installed belowground between the BESS and the substation site. The construction methodology would primarily involve:

- Establishment of the works area and installation of appropriate environmental controls
- Excavation, cable laying, backfilling and rehabilitation works between the approved BESS and busbar location at the substation site using a rubber tracked mini excavator
- Cable connection to the BESS and 22 kV busbar at the substation site
- Testing and commissioning activities
- Demobilisation.

More specific design approaches may be required close to the substation and to cross the ephemeral drainage line and unsealed road. A comparison of the approved Original Project and Modified Project is provided in Table 4-1. Further discussion regarding the construction activities is provided in **Section 4.2**.

Table 4-1 Modified project summary table

Project	Original Project	Modified Project
Key features	• 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 a 22 kV overhead powerline connecting through a 22 kV busbar at the substation.	• 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 a 22 kV overhead and/or below ground powerline connecting through a 22 kV busbar at the substation.
Approved development	The approved Project would be generally comprised of the following components: • 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	The Project as modified would be generally comprised of the following components: • 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

Project	Original Project	Modified Project
	- 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.	- 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.
Project layout	Refer to Figure 3-1 .	Refer to Figure 4-1 .
Site description	The proposed location of the BESS site is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). The substation site located at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040). The overhead transmission connection between the BESS site and the substation site would traverse Lot 7302 DP 1181129.	The proposed location of the BESS site is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). The substation site located at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040). The transmission connection between the BESS site and the substation site would traverse Lot 7302 DP 1181129; either above ground, below ground in part or in full.
Access	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 (located on Lot 7302 DP 1181129) would be utilised during emergencies.	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 (located on Lot 7302 DP 1181129) would be utilised during emergencies.
Grid connection	An above ground 22 kV transmission connection from the Site to the substation site.	An above ground or below ground (or combination of both) 22 kV transmission connection from the Site to the Transgrid Broken Hill substation
Construction		
Construction activities	Construction works would involve: - Enabling works - Civil, Structural, mechanical and electrical works - Commissioning - Demobilisation A construction laydown area will be provided on the Site.	Construction works would involve: - Enabling works - Civil, Structural, mechanical and electrical works - Commissioning - Demobilisation A construction laydown area will be provided on the Site.
Plant and equipment	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	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

Project	Original Project	Modified Project
	and equipment has been broadly categorised into the following activities: • Enabling works - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: - 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 - Compacters and rollers - Scrapers - Backhoe - Generators - Light vehicles, heavy rigid and articulated trucks (including multi trailer), low loaders. • Commissioning: - Elevated work platforms - Cranes - Generators - Light vehicles. • Demobilisation: - Heavy vehicles including road trucks - Water Trucks - Backhoe - Compactors - Light vehicles. • Maintenance equipment: - Chainsaws - Tractors - Light vehicles - Woodchippers/ mulchers.	and equipment has been broadly categorised into the following activities: • Enabling works - Front end loaders - Dump trucks - Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: - 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 - Compacters and rollers - Scrapers - Backhoe - Generators - Light vehicles, heavy rigid and articulated trucks (including multi trailer), low loaders. • Commissioning: - Elevated work platforms - Cranes - Generators - Light vehicles. • Demobilisation: - Heavy vehicles including road trucks - Water Trucks - Backhoe - Compactors - Light vehicles. • Maintenance equipment: - Chainsaws - Tractors - Light vehicles - Woodchippers/ mulchers.
Construction duration	Construction of the approved Project is intended to take approximately 12 months to complete.	Construction of the Project (as modified) is intended to take approximately 12 months to complete.

Project	Original Project	Modified Project
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.	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	The construction activities would be primarily carried out during standard construction hours, as defined by the <i>Interim Construction Noise Guideline</i> , being: 7am to 6pm, Monday to Friday 8am to 1pm, Saturdays - No work on Sundays or public holidays.	The construction activities would be primarily carried out during standard construction hours, as defined by the <i>Interim Construction Noise Guideline</i> , being: 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.	Up to 50 light vehicles and 20 heavy vehicles per day at peak.
Operation		
Operational life expectancy	The approved 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.	The Project (as modified) 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 approved Project would be an unmanned facility that is managed remotely. One to three employees would be required periodically for maintenance activities.	The Project (as modified) 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.	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 approved Project would have a charge and discharge cycle of up to 100 MW/h.	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 (as modified) 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 approved Project.	Existing services and utility infrastructure in the nearby vicinity would be extended, adapted and augmented to meet the demands of the Project (as modified).

Legend

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

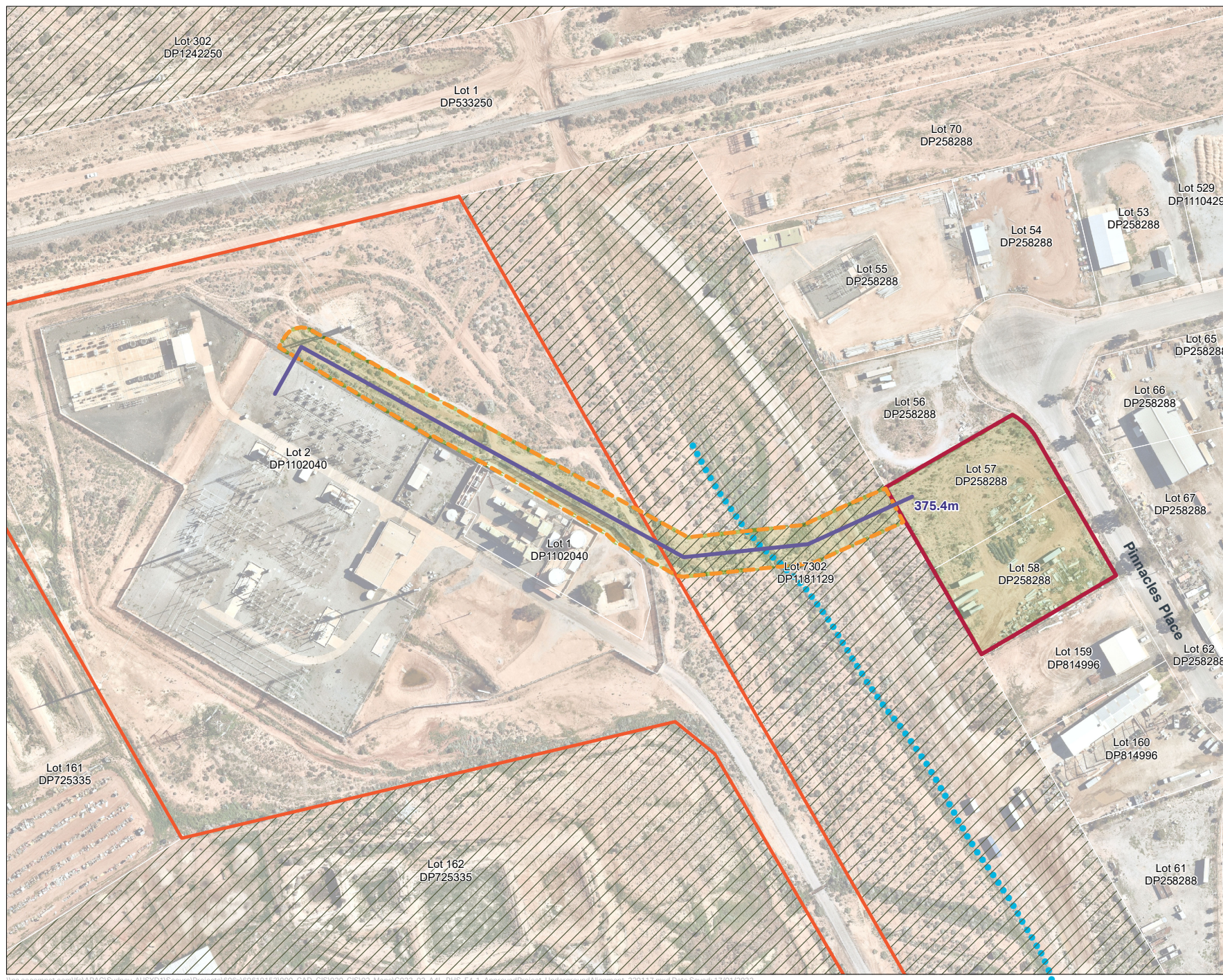


FIGURE 4-1:
PROPOSED MODIFICATION

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Indicative only, subject to detailed design.

Source: Imagery @ Nearmap, 2021



- Site
- Opengrid 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

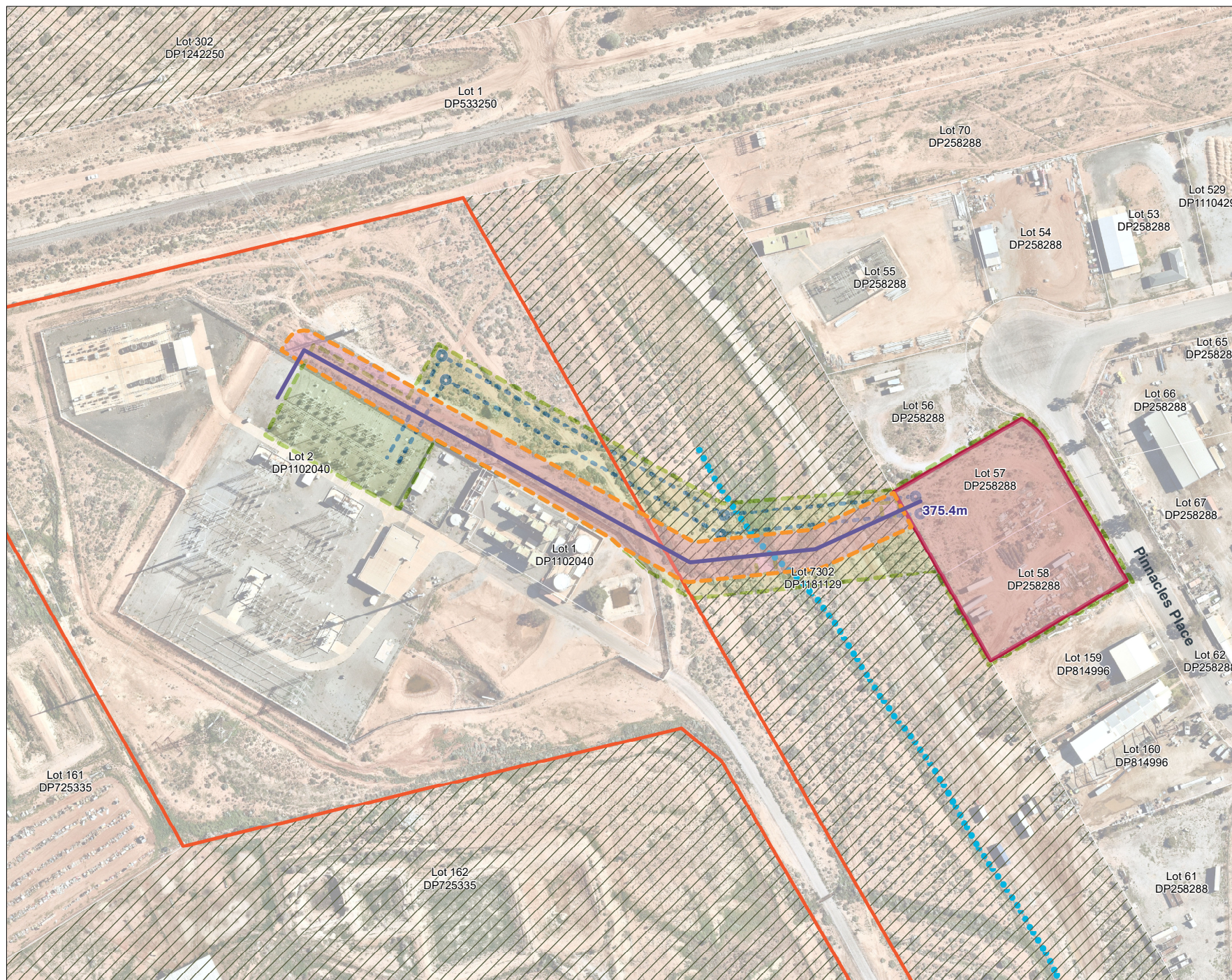
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Source: Imagery @ Nearmap, 2021



4.2 Transmission connection construction

4.2.1 Construction methodology

The proposed works to install the transmission connection between the BESS and Transgrid substation are provided below. The approach to constructing the BESS was detailed within the EIS for the Project and is not repeated in this report.

As the modification involves seeking development consent for the option of installing the transmission connection either above ground or belowground, the description below includes approaches for both options. All works described below except for those described under the header 'belowground option' were assessed and approved as part of the development consent for SSD-11437498.

The construction methodology for installing the transmission connection would involve:

- Enabling works - Enabling works would be carried out to prepare the modification area for the construction of the transmission connection. Works would include:
 - Establish site access arrangements
 - Establish construction amenities
 - Establish laydown area in the modification area.
 - Installation of erosion and sediment controls
 - Site clearance activities
- Cable installation works – The connection cables would be installed between the Site and the substation site, either above or belowground (in part or in full) as follows:

Aboveground option

- Construction of transmission connection between the Site and Transgrid Broken Hill substation would include installation of supporting structures, stringing the transmission line, and works at the transmission line landing gantry within the Site and the 22 kV busbar at the substation. The disturbance footprint of this installation would be likely be limited to construction of one support structure within the Site, and the construction of a support structure/s within the Commons, and the substation site. The cable would then span into the busbar for connection. A temporary access track would be used during stringing of the transmission line.
- Connection and commissioning - This phase would include connecting the transmission cables to the substation busbar and the BESS, testing, and commissioning activities. Commissioning would include testing the operation of all elements of the modification including the connection lines to ensure it is operating in accordance with performance requirements.
- Demobilisation - At the completion of construction temporary construction facilities would be removed together with remaining construction equipment.

Belowground option

- Remove and stockpile topsoil from belowground cable route
- Excavating a trench of around 1180 mm deep and 720 mm wide and stockpiling excavated material
- Laying the cables in a trefoil configuration
- Backfilling the trench (including laying marking tape and protective cover)
- Rehabilitating the surface with stockpiled topsoil

At three locations along the transmission connection corridor, more specific construction approaches would be used. These include:

- Trough crossing - The transmission lines would have an interaction with planned 22 kV cable connections within the Transgrid Broken Hill substation. At this location it is planned to locate the proposed cable trench for the BESS connection underneath the future trough for the Transgrid 22 kV cables. To facilitate this and manage thermal loads a concrete sleeve would be installed at the base of the trench for the BESS transmission lines to pass through. This sleeve would be located beneath Transgrid's cable trough.
- Road crossing – An unnamed, unsealed road is located between the Site and the ephemeral drainage line. Where the proposed connection lines cross this road, the trench would be up to 1300 mm deep and 1000 mm wide and the cable would be installed in a conduit to provide protection.
- Ephemeral drainage line crossing – The connection lines would be protected where they cross the ephemeral drainage line from tunnel erosion using conduits and/or belowground concrete protection.

4.2.2 Materials, stockpiling and laydown areas

Material storage, stockpiling and the establishment of laydown areas would be consistent with the construction activities approved under SSD-11437498. Excavated soils would be temporarily stockpiled next to the connection lines trench before being used as backfill.

4.2.3 Construction program

Installation of the belowground transmission connection is anticipated to begin in mid-2022 and would take up to four weeks to complete. The proposed construction program for installing the transmission connection belowground, and indicative schedule of works is provided in **Table 4-2** below.

Table 4-2 Indicative Program

Task	Duration (approx.)
Enabling works - Location of existing utilities and where required, utility adjustment work	Week (W)1 to W2
Enabling works - Establishment of the construction site and installation of environmental controls	W1 to W2
Trenching, transmission lines installation, and backfilling	W2 to W3
Rehabilitation and Commissioning	W3 to W4
Demobilisation	W4

4.2.4 Construction equipment

The likely equipment and plant required to install the transmission connection belowground include:

- Trencher
- Excavator
- Cranes
- Backhoe
- Material and delivery trucks
- Rubber tracked mini excavator
- Water cart.

4.2.5 Workforce

The modification would not alter the anticipated workforce of up to 50 construction workers (at peak) noted in Section 4.3.6 of the EIS.

4.2.6 Construction hours

Installation of the connection works would occur during standard construction hours, where practicable. The standard hours of construction are as follows:

- Monday to Friday between 7:00am and 6:00pm
- Saturday from 8:00am to 1:00pm
- No work on Sundays or public holidays.

No out of hours works are anticipated for the transmission connection works. Should out of hours works be required these would be undertaken in line with the conditions of consent for SSD-11437498.

4.2.7 Construction traffic, parking and access

Construction traffic, parking and access remains consistent with SSD-11437498. Construction activities would require temporary access to Lot 7203 DP 1181129. Access to the substation site would likely be provided via the existing accessway off Pinnacles Road.

4.2.8 Operation

The operation of the transmission connection would involve the periodic maintenance of the transmission cables and conduits.

The Project would be an unmanned facility that is managed remotely. It is anticipated that one to three employees would be required periodically for maintenance activities across the whole Project.

4.3 Consolidated project description

A consolidated, detailed description of the modified Project has been provided in **Appendix A**.

5.0 Strategic and statutory context

5.1 Strategic context

The Project, if modified, would continue to align with the following local and state plans (discussed in more detail in Section 5.2 of the EIS):

- **Far West Regional Plan 2036** - The modified Project would align with the relevant key priorities identified for the western area of the Regional Plan by supporting the growth of renewable energy industries, support the transition to a renewable energy economy and would respect, protect and conserve European and Aboriginal cultural heritage assets through the implementation of safeguards to mitigate potential impacts.
- **Broken Hill Local Strategic Planning Statement** – The modified Project is consistent with a number of local planning priorities and actions contained within the Local Strategic Planning Statement, specifically local planning policy ‘industry’ and ‘services and connectivity’.
- **Broken Hill 2033 Community Strategic Plan** – The modified Project would continue to align with directions ‘Our Community’, ‘Our Economy’, ‘Our Environment’ and ‘Our Leadership’.
- **Transmission Infrastructure Strategy 2018** – The objectives of the modified Project (outlined in **Section 1.3.2**) align with the driving principles and goals set out in the *NSW Transmission Infrastructure Strategy*. The modified Project would assist in the provision of secure and reliable energy and would promote job opportunities and support regional economic growth.
- **NSW Electricity Strategy 2019** – The modified Project, being a commercial scale energy storage system, would support the transition of the NSW energy grid to a modern complex energy system in line with the objectives of the *NSW Electricity Strategy* (NSW Government, 2019).
- **NSW Energy Roadmap 2020** – AGL has a clearly articulated plan to achieve decarbonisation of generation by 2050, wholly aligned with the NSW Climate Change Policy Framework and not inconsistent with the Net Zero Plan (AGL, 2015). The modified Project would contribute to AGL’s plans to manage the transition to decarbonisation and net-zero emissions while responding to the requirements of the market in relation to reliable and affordable electricity.
- **Broken Hill Sustainability Strategy** – The modified Project would continue to be consistent with the relevant action plans and strategies contained within the Broken Hill Sustainability Strategy.

5.2 Statutory Context

5.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act regulates development in NSW. The EP&A Act is supported by EP&A Regulation and a number of Environmental Planning Instruments (EPIs), which include State Environmental Planning Policies (SEPPs) and Local Environment Plans (LEPs). Part 4 of the EP&A Act establishes a framework for assessing development, categorising it as either ‘exempt development’, ‘complying development’, ‘development that requires consent’, or ‘prohibited development’. The term ‘development’ is defined under section 1.5 of the EP&A Act.

The modification area is in Broken Hill, within the Broken Hill Council LGA. Development of the approved and modified Project is governed by the EP&A Act. The following EPIs are considered relevant to the modification and have been considered:

- *State Environmental Planning Policy (State and Regional Development) 2011*
- *State Environmental Planning Policy (Infrastructure) 2007*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2018*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
- *State Environmental Planning Policy No. 55 – Remediation of Land*
- *Broken Hill Local Environmental Plan 2013.*

Furthermore, under Section 4.15(1)(a) (iii)(a) of the EP&A Act, the modification must consider:

- *Any planning agreement that has been entered into under section 7.4 of the EP&A Act.*

Each relevant EPI and matter for consideration as identified under Section 4.15 of the EP&A Act are discussed in further detail below.

Matters of consideration

In determining a modification application under section 4.55(2) of the EP&A Act, the consent authority must take into consideration the matters listed under section 4.15(1) of the EPA Act. However, because the modification relates to an approved SSD application (SSDA), the *Broken Hill Development Control Plan 2016* (DCP) does not apply. Consequently, this Modification Report does not require an assessment against Section 4.15(1)(a)(iii) of the EP&A Act. The table below identifies each matter of consideration listed under section 4.15(1) and the location where each matter is addressed in this Modification Report.

Table 5-1 Matters of Consideration under section 4.15(1) of the EP&A Act

Section 4.15(1) Requirement	Document Reference
The provisions of any of the following that apply to the land to which the development application relates.	
Any environmental planning instrument, and	Section 5.2.1 and Section 5.2.4
Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and	Section 5.2.4
Any development control plan, and	Section 5.2.5
Any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter under section 7.4, and	Section 5.2.7
The regulations (to the extent that they prescribe matters for the purpose of this paragraph), and	Section 5.2.2
The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality, and	Section 7.2 to 7.6
The suitability of the site for the development, and	Chapter 1.5
Any submissions made in accordance with this Act or the regulations, and	Chapter 6.0 Consultation and Chapter 10.0 Evaluation and justification
The public interest	

Permissibility

The approved Project was classified as SSD under the EP&A Act as it satisfied the requirements of Clause 8 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), being:

- The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act*
- The development is specified in Schedule 1 or 2 of the SRD SEPP.*

The approved Project is defined under the Standard Instrument as electricity generating works, as this definition includes a building or place used for the purpose of electricity storage. The Project Area is zoned as IN1 – General Industrial under the *Broken Hill Local Environmental Plan 2013* (Broken Hill LEP), which is a prescribed industrial zone for electricity generating works under *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP). Electricity generating works are permissible in the IN1

zone under Broken Hill LEP. In addition, clause 34(1)(b) of the ISEPP provides that development for the purposes of electricity generating works may be carried out by any person with development consent on land within a prescribed industrial zone, which means that the Project is “*not permissible without development consent under Part 4 of the EP&A Act*”. Further, the transmission connection between the Site and the Transgrid Broken Hill substation is also on IN1 zoned land and would be permissible with consent either as part of the energy storage facility or as being ancillary to that facility.

Clause 20 of Schedule 1 to the SRD SEPP prescribes development for the purpose of electricity generating works with a capital investment value (CIV) of greater than \$30 million as SSD. As the Project is defined as electricity generating works and the CIV for the approved Project was estimated at \$80 million, the approved Project was classified as SSD.

The modification is consistent with the approved Project as it allows for the safe delivery of the transmission connection between the BESS and the substation site. As discussed in **Section 1.4**, it can be concluded that the Project would remain “*substantially the same development as the development for which the consent was originally granted*”. On this basis, AGL is seeking to modify the development consent for the approved Project, pursuant to section 4.55 of the EP&A Act.

The modification is permissible as it is substantially the same development as the approved Project which was permissible.

5.2.2 Environmental Planning and Assessment Regulation 2000

This Modification Report has been prepared in accordance with the relevant requirements of the *Environmental Planning and Assessment Regulations 2000* (EP&A Regulations); specifically, clause 50 and 115AA, as they apply to the modification. Clause 115AA of the EP&A Regulation outlines the information that must be included within this Modification Report. The relevant requirements contained under clause 115AA and where these have been addressed in the Modification Report are shown below in **Table 5-2**.

Table 5-2 Modification Report statutory requirements

Clause	Requirement	Reference
An application for modification of a development consent for State significant development under the Act, section 4.55(1), (1A) or (2) or 4.56(1) must:-		
115AA(a)	Be in the form approved by the Planning Secretary and made available on the NSW planning portal	This Modification Report has been prepared in the form approved by the Planning Secretary and will be made available on the NSW planning portal
115AA(b)	Include particulars of the nature of the proposed modification to the development consent	Section 1.3 of this Modification Report outlines the need for the proposed modification. Whereas, Section 1.4 details the nature of the proposed modification in relation to the requirements contained under section 4.55(2) of the EP&A Act.
115AA(c)	Be prepared having regard to the State Significant Development Guidelines	This Modification Report has been prepared having regard to the State Significant Development guidelines (refer to Section 1.5).
115AA(d)	Be lodged on the NSW planning portal	The proposed modification will be lodged via the NSW planning portal.

5.2.3 State Environmental Planning Policies

State Environmental Planning Policy (State and Regional Development) 2011

The *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) applies to the whole of NSW. It aims to identify development that is significant to the State. As noted above, the approved Project was classified as SSD under clause 8 of the SRD SEPP. On the basis that the modification relates to a SSD, clause 11 of the SRD SEPP stipulates that development control plans do not apply.

State Environmental Planning Policy (Infrastructure) 2007

The aim of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) is to facilitate the effective delivery of infrastructure across the State. As discussed above, the modification is permissible with consent at the modification area under clause 34 of the ISEPP.

In addition, clause 45 of the ISEPP applies to an application for development (including modifications) comprising or involving any of the following (reproduced from clause 45(1) of the ISEPP):

- (a) *The penetration of ground within 2m of an underground electricity power line or an electricity distribution pole or within 10m of any part of an electricity tower.*
- (b) *Development carried out-*
 - (i) *Within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or*
 - (ii) *Immediately adjacent to an electricity substation, or*
 - (iii) *Within 5 m of an exposed overhead power line.*
- (c) *[Not relevant]*
- (d) *Development involving or requiring the placement of power lines underground, unless an agreement with respect to the placement underground of power lines is in force between the electricity supply authority and the council for the land concerned.*

The modification area is situated in proximity to a number of overhead electricity transmission lines and will involve development within and immediately adjacent to the existing Transgrid Broken Hill substation. The modification may also require the placement of powerlines belowground and, therefore, triggers clause 45(1)(d) under the ISEPP. On this basis, the requirements under clause 45 are applied to this modification application, and the requirements under Clause 45(2) must be considered.

Clause 45(2) states that *'before determining a development application (or an application for modification of a consent) for development to which this clause applies, the consent authority must:*

- (a) *Give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and*
- (b) *Take into consideration any response to the notice that is received within 21 days after the notice is given.*

In light of this requirement, it is expected that DPE will refer this modification application to Transgrid to provide comment, specifically in relation to potential safety risks.

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The aims of the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) are the protection of the biodiversity values of trees and other vegetation in non-rural areas of the State and to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation. Clause 7(1) of the Vegetation SEPP states that *'a person must not clear vegetation in any non-rural area of the State to which Part 3 applies without the authority conferred by a permit granted by the council'*. In addition, Clause 7(2) further states that *'a person must not clear native vegetation in any non-rural area of the State that exceeds the biodiversity offset scheme threshold without the authority conferred by an approval of the Native Vegetation Panel under Part 4'*.

It has been established under **Section 5.2.3** that the modification relates to a SSD, and subsequently the Broken Hill DCP does not apply. As such, a permit under Part 3 of the Vegetation SEPP is not considered relevant, as it requires the application of the DCP.

Instead, Part 4 has been considered as it relates to approval by the Native Vegetation Panel for clearing native vegetation in non-rural areas. The modification is located within a disturbed industrial environment, which has limited remnant vegetation of low to moderate quality. The assessment presented in **Section 7.2**) confirms that the development would not take place in an area of significant biodiversity value, nor would it have a significant direct or indirect effect on biodiversity values, such as:

- Threatened species or ecological communities, or
- Other values prescribed in the *Biodiversity Conservation Regulation 2017*.

As such, it is considered unlikely that the modification would have a significant impact on any biodiversity values prescribed by the *Biodiversity Conservation Regulations 2017*. In light of this assessment, approval from the Native Vegetation Panel (Under Part 4 of the Vegetation SEPP) is not required to support this modification to the approved SSD.

State Environmental Planning Policy No. 55 – Remediation of Land

The objects of *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) are to provide a State-wide planning approach for the remediation of contaminated land and to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP 55 restricts consent authorities from issuing development consent on land that may be contaminated, unless the consent authority is satisfied that the land in question is suitable for the development proposed to be carried out or would be suitable if appropriate remediation is undertaken. The modification area is not on the list of NSW Contaminated Sites Register and does not appear on the Contaminated Land: Record of Notices.

Section 7.4 details the potential for the modification to result in contamination impacts to any receiving environments. A contamination assessment was been prepared as part of the EIS for the approved Project. The assessment confirmed that the modification area is suitable to support the transmission connection.

5.2.4 Broken Hill Local Environmental Plan 2013

The modification is located within the Broken Hill LGA, which is subject to the application of the Broken Hill LEP. The Broken Hill LEP aims to make local environmental planning provisions for land in Broken Hill. It is important to note that Broken Hill Council has chosen not to adopt a few principal development standards (i.e., Part 4 of the LEP), including:

- Clause 4.3 – Height of buildings
- Clause 4.4 – Floor space ratio.

In light of this, no further consideration will be afforded to these principal development standards as part of this Modification Report. Instead, the clauses that are relevant to consider include:

- Clause 2.3 – Zone objectives and land use table
- Clause 5.10 – Heritage conservation.

Each relevant clause of the Broken Hill LEP is discussed in further detail below.

Zone objectives and land use table

The modification is located within an area zoned as IN1 General Industrial under the Broken Hill LEP. The objectives of the IN1 General Industrial land use zone include:

- *To provide a wide range of industrial and warehouse land uses*
- *To encourage employment opportunities*
- *To minimise any adverse effect of industry on other land uses*
- *To support and protect industrial land for industrial uses.*

The modification continues to be defined as ‘*electricity generating works*’, which is permitted with consent, as an innominate use, in the IN1 General Industrial land use zone under the Broken Hill LEP. Notwithstanding, the modification would also be considered consistent with the objectives of the IN1 General Industrial land use zone on that basis that:

- It will provide additional employment opportunities (detailed in **Chapter 4.0 Modification**) particularly during construction of the modification
- It will facilitate the provision of complimentary service to the local industrial land uses
- Given the nature of the modification, it's highly unlikely it will adversely impact adjoining industrial land uses.

In light of the above, the modification is permissible with consent in the IN1 General Industrial land use zone, as well as being consistent with the relevant objectives.

Heritage conservation

Clause 5.10 of the Broken Hill LEP provides specific provisions for the protection of heritage items, heritage conservation areas, archaeological sites, Aboriginal objects and Aboriginal places of heritage significance within the Broken Hill LGA. Clause 5.10(8) of the Broken Hill LEP states:

The consent authority must, before granting consent under this clause to the carrying out of development in an Aboriginal place of heritage significance:

- Consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and*
- Notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.*

Schedule 5 under the Broken Hill LEP lists heritage items, conservation areas and archaeological sites within the Broken Hill LGA. A review of Schedule 5 indicates that there are no known Aboriginal objects or places of heritage significance located within the modification area.

5.2.5 Broken Hill Development Control Plan 2016

As detailed within **Section 5.2.1**, given that the modification is SSD, the DCP does not apply. Notwithstanding this exemption, the DCP has been considered for stormwater management (refer to **Section 7.2**), where it provides the most relevant assessment framework within the Broken Hill LGA.

5.2.6 Draft environmental planning instruments

Section 4.15(1)(a)(ii) of the EP&A Act requires the consent authority to consider:

Any proposed instrument that is or has been the subject of public consultation under this [EP&A] Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved.

At the time of lodgement of the this modification application there were no draft environmental planning instruments that are relevant to the modification or modification area that should be considered as part of the assessment.

5.2.7 Voluntary planning agreements

Section 4.15(1)(a)(iii) of the EP&A Act requires the consent authority to consider any planning agreement that has been entered into under section 7.4 of the Act, or any draft planning agreement that a developer has offered to enter into under section 7.4. At the time of lodgement of this modification application there were no known planning agreements applicable to the modification or the Site.

5.2.8 Other NSW legislation

Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was established to provide land rights to Aboriginal persons, as well as provide for representative Aboriginal Land Councils to vest land in those Councils. The ALR Act, is administered by the NSW Department of Aboriginal Affairs and establishes a compensatory regime, which recognises that land is of spiritual, social, cultural and economic importance to Aboriginal people. The ALR Act established the NSW Aboriginal Land Council (NSWALC) and a network of over 120 Local Aboriginal Land Councils (LALCs) and requires these bodies to:

- Take action to protect the culture and heritage of Aboriginal persons in the LALC's area, subject to any other law
- Promote awareness in the community of the culture and heritage of Aboriginal persons in the LALC's area.

LALCs constituted under the ALR Act can make claims. The Registrar of the ALR Act must maintain the Register of Aboriginal Land Claims under section 166 of the ALR Act. All land claims that have been made under the Act are recorded in the Register.

The parcel (Lot 7302 of DP1181129), where modification to the transmission connection is proposed, is subject to an undetermined Aboriginal Land Claim number 40469 lodged by the NSWALC under the ALR Act. AGL undertook consultation with BHLALC and the NSWALC over the land claim as part of the EIS and again as part of the modification (see **Chapter 6.0 Consultation**).

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Environment, Energy and Science (EES) Group of the DPE, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Chief Executive responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined as follows:

- An *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of the area that compromises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- An *Aboriginal place* is a place so declared by the Ministers under section 84 of the NPW Act because in the opinion of the Minister, the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.

A permit is required under section 90 of the NPW Act before harming or desecrating an Aboriginal object, otherwise, such action is an offence under the NPW Act. Despite this, under section 4.41 of the EP&A Act, an Aboriginal Heritage Impact Permit is not required for SSD. Instead, potential impacts to Aboriginal heritage are typically managed under Aboriginal Cultural Heritage Management Plans (ACHMPs), required under relevant conditions of consent.

Water Management Act 2000

The *Water Management Act 2000* (WM Act) establishes a framework for managing water in NSW. Section 91 of the WM Act discusses activity approvals and notes that there are two types of approvals, namely controlled activity approvals and aquifer interference approvals.

The WM Act specifies certain activities as controlled activities when carried out on waterfront land. This is defined as within 40 metres of the banks of a river, lake or estuary (or are prescribed by the regulations). The modification potentially requires trenching across the ephemeral watercourse within the modification area. Trenching across a natural watercourse is considered a controlled activity that would normally require approval under the WM Act. However, as the modification is part of a SSD, under Section 4.41 of the EP&A Act it is exempt from the controlled activity approval process.

Section 4.41 of the EP&A Act does not remove the requirement for obtaining an aquifer interference approval. Field investigations were carried as part of the approved EIS to a depth of 8 metres below

natural ground level. Groundwater was not encountered during these investigation activities. As such, the requirement for an aquifer interference approval is unlikely for the modification.

Protection of the Environment Operations Act 1997

The objects of the *Protection of the Environment Operations Act 1997* (POEO Act) include to rationalise, simplify and strengthen the regulatory framework for environment protection. Chapter 3 of the POEO Act outlines the specific circumstances under which an environment protection licence (EPL) must be obtained.

Schedule 1 of the POEO Act provides a list of activities for which an EPL would be required. Clause 17 of Schedule 1 lists general electricity works as a scheduled activity where they exceed the capacity to generate 30 MW. The Project (as modified) does not involve the generation of electricity. The modification would support the storage and release of electricity that has already been generated. Accordingly, an EPL is not required for the modified Project.

Contaminated Land Management Act 1997

The general object of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land that the NSW Environment Protection Authority (EPA) considers to be contaminated enough to require regulation under Division 2 of Part 3. A search of the NSW EPA contaminated land database (undertaken on 7 February 2022) confirmed that the Site and modification area is not listed as a contaminated site under the CLM Act. As a result, no further attention is afforded to the CLM Act for the purpose of this modification application. Section 60 of the CLM Act also includes a 'duty to notify' where significant contamination is identified. This section would be relevant if any previously unidentified contamination is encountered that exceeds notification thresholds.

Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (described in section 6(2) of the *Protection of the Environment Administration Act 1991*).

Section 7.9(2) of the BC Act states that a development application for SSD is to be accompanied by a biodiversity development assessment report (BDAR) (as defined under section 7.1 of the BC Act), unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.

A BDAR was undertaken for the approved Project. The BDAR is provided in Appendix B of the EIS. An impact assessment was undertaken in the BDAR in accordance with the Biodiversity Assessment Method (BAM) 2017, which outlines the avoidance, management and mitigation measures that have been incorporated into the Project design or would be employed during construction, operation or completion of the Project to reduce impacts on biodiversity values.

To support this modification application the BDAR that was produced for the approved Project has been updated to assess the modification. The updated BDAR is provided in **Appendix B**. The primary objective of this BDAR is to use the Biodiversity Assessment Methodology (BAM) (OEH 2017) 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. A summary of the findings within this BDAR are provided in **Section 7.2**.

Roads Act 1993

An object of the *Roads Act 1993* (Roads Act) is to confer certain functions (in particular, the function of carrying out road work) on Transport for NSW and on other road authorities, among others. Section 7 of the Roads Act defines the respective road authorities depending on the classification of road. Of relevance to this modification is Pinnacles Place, which is a local road under the Roads Act. The Council of a local government area is the roads authority for all public roads within the area, other than:

- Any freeway or Crown road

- Any public road for which some other public authority is declared by the regulations to be the roads authority.

Section 138 of the Roads Act relates to works and structures, whereby *a person must not erect a structure or carry out a work in, on or over a public road... otherwise than with the consent of the appropriate road's authority*. No work is proposed to be carried out in, on or over a public road (i.e., Pinnacles Road and Pinnacles Place). By using existing site access arrangements and by ensuring that no work is conducted within the road corridor, a section 138 approval is not required under the Roads Act. As such, no further consideration is afforded to the Roads Act as part of this modification application.

Heritage Act 1977

The *Heritage Act 1977* aims, among other things, to promote an understanding, encourage conservation and provide for protection of NSW State heritage. State and/or local heritage significance can relate to historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values of a place, building, work, relic, moveable object or precinct.

A search of available non-Indigenous heritage databases identified that the closest listed item of non-Indigenous heritage to the modification is the Old Broken Hill City Abattoir (I100); located approximately 800 metres south-east of the BESS site. Due to the distance of the modification from the nearest non-Indigenous heritage item, it is not anticipated that it would have an adverse impact upon non-Indigenous heritage.

Commons Management Act 1989

The *Commons Management Act 1989* (NSW) (CM Act) aims to provide for the establishment of trusts in relation to commons and the election of trust boards, and in certain cases the appointment of local authorities or administrators to:

- Manage the affairs of those trusts
- Provide for the care, control and management of commons
- Provide for related matters.

As discussed in **Section 1.5** the transmission connection would cross Lot 7302 DP 1181129, which has been identified as being a portion of the Willyama Common Trust (the Trust). The Trust has established a Plan of Management (PoM) in accordance with section 25 of the CM Act and clause 29 of the *Commons Management Regulation 2018* (CM Regulation). The purpose of this PoM is to address the specific uses for which the Willyama Common may be used in terms of the CM Act and CM Regulation. The following zone classifications apply to land within the Willyama Common:

- Zone 1(a) General Rural Zone
- Zone 1(c) Rural Small Holdings Zone
- Zone 1(m) Mining Zone
- Zone 7(a) Environment Protection (Regeneration Reserve) Zone.

These land use zones were repealed upon the introduction of the *Broken Hill Local Environmental Plan 2013* (refer to **Section 5.2.1**). A review of Council's records indicate that the modification area was formerly zoned Zone 1(a) General Rural Zone under the *Broken Hill Local Environmental Plan 1996* (now repealed). The objectives of Zone 1(a) General Rural Zone, as detailed within section 3.4.1.1 of the PoM is to promote the proper management and utilisation of resources. The PoM prohibits the following developments under Zone 1(a) General Rural Zone:

- Motor showrooms
- Residential flat buildings
- Shops (other than general stores not exceeding 200 square metres in gross floor area).

While permissibility is established in **Section 5.2.1**, the modification would be consistent with the intended development of the Site; being a permissible innominate land use under the PoM.

Consequently, the modification is consistent with the CM Act.

5.2.9 Commonwealth legislation

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long-term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult with the appropriate Minister of that state or territory.

No declarations relevant to the modification have been made under the ATSIHP Act.

Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on Matters of National Environmental Significance (MNES). Approval from the Commonwealth Minister is in addition to any approvals under NSW legislation.

The EPBC Act lists nine MNES that must be considered when assessing the environmental impacts of a project. These matters are:

- World heritage properties
- National heritage places
- Ramsar wetlands of international significance
- Threatened species and ecological communities
- Migratory species
- Nuclear actions (including uranium mining)
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

The results of a Protected Matters search for MNES within 10 km of the Site are provided in **Table 5-3**.

Table 5-3 MNES within 10 km of the Site

MNES	MNES within 10 km of the Site
World Heritage Properties	None
National Heritage Places	1
Wetlands of International Importance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Park	None
Listed Threatened Ecological Communities	None
Listed Threatened Species	10
Listed Migratory Species	8

The EPBC Act also requires Commonwealth approval for any activity that will, or is likely to have, a significant impact on Commonwealth land. The land on which the modification would be constructed is

not Commonwealth land, and there is no Commonwealth land within proximity to the modification that could be impacted by the construction or operation of the transmission connection.

The BDAR (discussed in **Section 7.2**, and contained in **Appendix B Biodiversity Development Assessment Report**) has identified threatened biodiversity listed under the EPBC Act that may be potentially impacted by the modification.

Under the EPBC Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) (NHL) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies) (CHL). These two lists replaced the Register of the National Estate (RNE), which was closed in 2007. Statutory references to the RNE in the EPBC Act were removed on 19 February 2012; however, the RNE retains an archive of over 13,000 heritage places throughout Australia.

A search of the Australian Heritage Database, which includes places listed on the World Heritage List (WHL), NHL, CHL, RNE and List of Overseas Places of Historic Significance to Australia, was undertaken for the EIS in January 2021 and again for this Modification Report in November 2021. One item was returned, being the entire Broken Hill LGA, which is listed on the NHL.

Under the EPBC Act, activities that have the potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Energy for assessment. An EPBC referral was submitted for the Project in January 2021. The EPBC referral was determined on 7 May 2021, which confirmed that the Project did not constitute a controlled action (EPBC 2021/8918). As stated in the determined EPBC referral, *The Project would consist of the following: Connection of the BESS facility to the nearby Transgrid Broken Hill substation via a 22kV overhead or if required underground powerline connecting through a 22kV busbar in the substation.* The determined EPBC referral submitted for the approved Project captured the modification area and the possibility of the belowground installation of the transmission lines. On this basis, a new EPBC referral for the modification is not necessary as the modification does not constitute a controlled action.

Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NT Act recognises native title for land over which native title has not been extinguished and where persons are able to establish native title are able to provide continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed, as well as a framework for notifying of native title stakeholders for certain future acts on land where native title has not been extinguished.

6.0 Consultation

6.1 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.

In addition to the consultation objectives for the modification, AGL has made the following commitments to the community:

- **Be proactive** – AGL will engage with communities to understand and respond to their interests and concerns
- **Be flexible and inclusive** – AGL will offer a range of engagement opportunities that are tailored to the variety of needs and preferences of the communities in which they operate
- **Be transparent** – AGL will act honestly and ethically in all their dealings with the communities in which they operate
- **Continuously improve engagement** – AGL will evaluate the effectiveness of their engagement and modify it as needed to ensure that their activities address community needs and expectations.

AGL's Community Engagement Policy has been informed through internal and external consultation, industry guidance, including the International Association of Public Participation (IAP2) Quality Assurance Standard (2015) and the Accountability AA1000 Stakeholder Engagement Standard (2011).

6.2 Community and stakeholder engagement

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

The modification is not expected to generate significant stakeholder interest due to the anticipated low level of impact. In addition, AGL has existing strong relationships with key local stakeholders due to ongoing community relations activities from the Broken Hill Solar Plant and Silverton Wind Farm. Stakeholder engagement has been targeted to keeping adjoining landowners and tenants and local stakeholders informed of the assessment process and anticipated Project activities such that questions can be identified and mitigated throughout the project planning. The outcomes of consultation are provided in **Section 6.3** of this Modification Report.

6.3 Consultation activities undertaken to date

6.3.1 Government and non-Government consultation

AGL has undertaken a suite of consultation to date on the modification with Government Agencies and Non-Government stakeholders.

A summary of the consultation with relevant stakeholders is presented in **Table 6-1**. Where relevant, a cross reference to where the issue has been addressed in the Modification Report is also provided.

Table 6-1 Government Agencies and Non-Government stakeholders consultation summary

Stakeholder	Method	Date	Comments	Where addressed in MR
Electricity Transmission Ministerial Holding Corporation (ETMHC) (Transgrid)	Formal connection enquiry, phone meetings and email	September 2021 and ongoing	Transgrid requested AGL to change the connection point to the substation.	Chapter 1.0 Introduction and Chapter 4.0 Modification
Broken Hill Local Aboriginal Land Council (BHLALC)	Phone meetings and email	September 2021 and ongoing	Discussions relating to the modification and change of construction methodology. Recommendation from the BHLALC to conduct test pitting as part of the ACHAR.	Chapter 1.0 Introduction Chapter 4.0 Modification Section 7.3 Aboriginal Heritage
Broken Hill City Council – Strategic Land Use Planner	Phone meetings and email	September 2021 and ongoing	Discussions relating to the modification and change of construction methodology. Consultation on land matters associated with the amended construction methodology.	Chapter 1.0 Introduction Chapter 4.0 Modification Chapter 6.0 Consultation Section 7.3 Aboriginal Heritage
Federal Member for Parkes, Mark Coulton MP	Email or phone call as required	Ongoing	Information was noted. No comments.	Not applicable.
NSW State Member for Barwon, Roy Butler MP	Email or phone call as required	Ongoing	Information was noted. No comments.	Not applicable.
Broken Hill City Council Board – Mayor Darriea Turley and (then) General Manager James Roncon	Email or phone call as required	Ongoing	Information was noted. No comments.	Not applicable.
NSW Government; DPE Water and Natural Resources Access Regulator – Project Officer (NRAR)	Email or phone call as required	November 2021	Information was noted. No comments.	Not applicable.

Stakeholder	Method	Date	Comments	Where addressed in MR
Department of Agriculture Water and the Environment (DAWE)	Phone	November 2021	Discussions relating to the modification and change of construction methodology. DAWE very happy to have been updated and will advise the Director as a courtesy.	Chapter 1.0 Introduction Chapter 4.0 Modification
Department of Planning, Industry and Environment	Phone	November 2021	Discussions relating to the staging and modification and change of construction methodology. DPE advised AGL to submit the staging request and modification application via the DPE Major Projects Portal.	Chapter 1.0 Introduction Chapter 4.0 Modification
Neighbours: • Scott Mengersen • Terry Capper • Macro Meats – Gourmet Game • Essential Energy • Mutooroo Pastoral Co Pty Ltd • Michael Beinke • Minister for Mineral Resources • Mipstar Australia Pty Limited • Broken Hill Veterinary Clinic Pty Ltd • Luke and Kelly Finch • Gary Sammut • Maria Saoma • W & C Cuy, A & L Wilson Ltd	Letter/email	As required	Information was noted. No comments.	Not applicable.

7.0 Environmental assessment

7.1 Environmental Scoping

7.1.1 Assessment approach

This Modification Report documents a number of environmental assessments. These environmental assessments identify potential environmental impacts that may result from the modification and identify appropriate measures to manage or mitigate these impacts (refer to **Chapter 9.0 Management and mitigation measures**).

The identification of potential impacts, and confirmation of appropriate assessment methodologies, is determined through a scoping process. The scoping process for this modification was based on:

- A review of available information and documents relating to the existing environment, including the EIS and associated SSD documentation for the approved Project
- Identifying the sensitivities of the local environment (refer to **Chapter 2.0 Site location and context**)
- Understanding the characteristics of the modification (refer to **Chapter 4.0 Modification**)
- A review of relevant legislation and planning policy (refer to **Chapter 5.0 Strategic and statutory context**).

7.1.2 Summary of potential issues identified

Following the scoping process, potential impacts were determined for the following environmental matters, as relevant to the modification. A risk assessment was then undertaken to determine the potential of environmental issues and prioritise the scope of work for each identified environmental matter. Environmental issues that were identified through this assessment process have been assessed and mitigation measures developed as described in **Chapter 9.0 Management and mitigation measures**.

Table 7-1 Prioritisation of environmental matters

High Priority Matters	Medium Priority Matters	Low Priority Matters
Nil.	• Biodiversity (Section 7.2) • Aboriginal Heritage (Section 7.3) • Soils, groundwater and contamination (Section 7.4). • Surface water, flooding and water use (Section 7.5)	• Other issues: - Non-Aboriginal Heritage (Section 7.6.1) - Noise and Vibration (Section 7.6.2) - Transport and access (Section 7.6.3) - Bushfire (Section 7.6.4) - Visual impact (Section 7.6.5) - Social and economic (Section 7.6.6) - Waste (Section 7.6.7) - Air quality (Section 7.6.8) - Cumulative impacts (Section 7.6.9).

7.2 Biodiversity

7.2.1 Methodology

A Biodiversity Assessment Report (BDAR) has been prepared to support the modification. The complete report is attached in **Appendix B** and summarised in this section. The BDAR documents an assessment of the modification on relevant ecological values in line with the Biodiversity Assessment Methodology (BAM) (OEH 2017). The BDAR details the outcomes of this assessment and demonstrates whether the modification is likely to have an impact on threatened biodiversity listed under the BC Act. Biodiversity offsetting requirements have also been identified.

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 2020a). 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 1.3). This section of the Modification Report provides a summary of the BDAR for the modification.

7.2.2 Existing environment

The modification area contains an ephemeral drainage line and associated vegetation as well as 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 regrowth of native flora species within highly disturbed areas, and a lack of larger woody vegetation across the modification area.

Landscape Features

A description of the Landscape features of the Modification Area is provided in **Table 7-2**.

Table 7-2 Landscape features

Landscape features	Description
Modification Area	The modification area encompasses 2.5 hectares (ha) of land.
IBRA bioregion/subregion	The modification area is located within the Barrier Range IBRA Sub-region which is within the Broken Hill Complex IBRA bioregion.
NSW (Mitchell) Landscapes	The modification area is mapped as occurring within the Barrier Downs Landscape.
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 watercourse that crosses the transmission connection corridor. This is classified as a 1 st order stream; however, no water was present during field surveys.
Wetlands within and adjacent to development	There are no wetlands in close proximity to the modification area.
Connectivity features	There is limited connectivity within the modification area due to the presence of roads, railway track and industrial infrastructure in neighbouring properties.
Geological significance and soils	There are no karst, caves, crevices, cliffs or other areas of geological significance within the modification area. There are no high hazard soil areas.

Native Vegetation

A desktop assessment and field survey were undertaken to determine the presence of native vegetation within and surrounding the modification area. A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the modification area.

A total of 37 flora species were recorded across the modification area, including 26 native species and 11 exotic species. Details of these species and full historic data recorded from field surveys performed throughout the identified vegetation zones are included in **Appendix B**.

Plant community type (PCT) *Bluebush shrubland on stony rises and downs in the arid and semi-arid zones* (PCT 155) in low and moderate condition is present across the modification area. This PCT does not qualify as a Threatened Ecological Community under either the BC Act or the EPBC Act.

Threatened flora

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. An additional two species identified in the EPBC Act PMST search as having a moderate likelihood of occurrence. Of the candidate species identified, two are species subject to serious and irreversible impacts (SAIL).

Plot/transect surveys and targeted threatened species surveys were conducted throughout the modification area and immediate surrounds. None of the threatened flora species were recorded during targeted searches. Based on the results of the field survey and habitat assessment, threatened flora species are considered to be absent from the modification area.

Threatened fauna

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. A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the modification area.

Threatened fauna requiring further assessment and/or survey under the BAM-C are detailed below in **Table 7-3**. **Table 7-3** also identifies whether targeted surveys were undertaken and whether the species were assumed present. Of the seven candidate threatened fauna species, only one, the *Ardeotis australis* (Australian Bustard) was identified as potentially present within the modification area.

In addition, one threatened fauna species listed under 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*).

Table 7-3 Candidate threatened fauna species with the potential to occur or require further survey

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAIL?	Habitat constraint (BAM)	Degraded habitat	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	Yes	BAM-C	No The species is known from one population at Packsaddle approximately 175 kilometres to the north of Broken Hill. It is very unlikely to be present within the study area. Opportunistic survey did not detect this species.	No
<i>Antaresia stimsoni</i>	Stimson's Python	V	n/a	No	Rocky areas within 500m of rocks or gibber	-	BAM-C	No Limiting habitat not present	No
<i>Ardeotis australis</i>	Australian Bustard	E	n/a	No	None identified in BAM-C	-	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
<i>Ctenophorus mirrityana</i>	Barrier Range Dragon	E	n/a	No	Rocky areas Requires rock crevices	-	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)	-	BAM-C	No Limiting habitat not present	No

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAIL?	Habitat constraint (BAM)	Degraded habitat	Reason for inclusion?	Survey undertaken and comments/justification	Presence
Candidate species									
<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	-	BAM-C	No Limiting habitat not present	No
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	n/a	No	None identified in BAM-C	Yes	BAM-C	No No nearby records (or any in the subregion), disturbance within the Project Area and poor match for any of the habitat it has been recorded in, the Project Area was deemed unsuitable.	No
Total number of species	7	-	-	1 x candidate SAIL	-	-	-	-	-

NSW and Commonwealth Status: CE=Critically Endangered, E = Endangered, V = Vulnerable. n/a = not applicable.

Based on the results of the BAM-C, field survey and habitat assessment, the species shown in **Table 7-4** were identified as present or absent from the modification area.

Table 7-4 List of predicted and candidate threatened species for the modification area

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Yes – assumed present
Bolam's Mouse	<i>Pseudomys bolami</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>Chalinolobus 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
Marble-faced Delma	<i>Delma australis</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 for further consideration
Thick-billed Grasswren (north-west NSW subspecies)	<i>Amytornis modestus obscurior</i>	No – closest population 175 kilometres 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. Species not detected

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Little Eagle	<i>Hieraaetus morphnoides</i>	No – key habitat features absent
MNES		
Dusky Hopping-mouse	<i>Notomys fuscus</i>	Yes – assumed present for further consideration

A likelihood assessment was undertaken to determine which of the species identified in **Table 7-4** are likely to occur within the modification area, with 23 predicted threatened species (ecosystem credit species) assumed to be present. Of the candidate species, two threatened fauna species have been assumed present for further consideration. These two species include:

- Dusky Hopping Mouse (*Notomys fuscus*). This species is threatened under the EPBC Act, has a moderate likelihood of occurrence in the modification area due to an association with PCT 155. 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 for sightings during field survey, it is highly unlikely to occur within the modification area.
- Australian Bustard (*Ardeotis australis*). This species is mobile and wide-ranging and could not be ruled out due to absence of limiting habitat. This species may move throughout the modification area on occasion. As such, this is the only candidate species which has been assumed present for offsetting purposes (refer to **Table 7-4**).

7.2.3 Impact assessment

The modification has the potential to result in direct and indirect impacts on biodiversity values. The majority of impacts on biodiversity would occur during construction from the clearing of native vegetation and removal of habitat for a limited range of flora and fauna. To understand these potential impacts and measures to avoid or mitigate them, this section provides:

- A description of how biodiversity impacts have been avoided, where possible
- A summary of the assessment of the potential direct and indirect impacts during construction
- A summary of the assessment of the potential direct and indirect impacts during operation.

These points are discussed further below.

Avoidance of impacts

In accordance with the BAM, the modification aimed to avoid, mitigate and offset impacts on biodiversity values.

A Preliminary Biodiversity Assessment (Niche Environment and Heritage, 2020) was conducted which identified the key biodiversity values and constraints relevant for the approved Project and modification. The Preliminary Biodiversity Assessment concluded that:

- All options for the modification area offered limited important habitat for threatened flora and fauna and were largely disturbed
- Native vegetation present across the options was limited to PCT 155, which was largely of low condition, with one patch in moderate condition. This section of moderate condition PCT would be avoided by the modified Project.

Mitigation measures proposed to be implemented during construction and operation of the approved Project would also be relevant to the modification and include measures to avoid impacts on biodiversity values within the modification area and its surrounds.

Construction impact assessment

Direct impacts

Potential direct impacts associated with construction of the modified Project and the likelihood that they would occur are outlined in **Table 7-5**.

Table 7-5 Assessment of direct impacts relevant to construction of the modified Project

Impact	Extent of impact as a result of the modification	Impact likelihood
Direct impacts		
Removal or modification of native vegetation	Approximately 0.31 hectares of low condition native vegetation (PCT 155) would be removed from the Site. Another 0.59 ha of low condition native vegetation (PCT 155) and 0.01 moderate condition native vegetation (PCT 155) occurs along the transmission connection which has a buffer of 20 metres. For the purposes of assessment, it has been assumed that all of this vegetation would also be removed. This is a worst-case scenario as all vegetation within the corridor would not require removal, and direct impacts would be limited to locations within the transmission corridor where vegetation requires removal. As noted above, moderate condition PCT would be avoided by the modified Project.	Known
Loss of individuals of a threatened species	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 modified Project.	Low
Removal or modification of threatened species habitat other than native vegetation (micro-habitat features)	The area to be impacted contains limited habitat features (e.g. coarse woody debris) which may be used by threatened species. Construction of the modified Project would not limit foraging or breeding habitat for threatened species within the locality. Vagrant or wide-ranging species such as the <i>Ardeotis australis</i> (Australian Bustard) may occur on occasion.	Low
Death through trampling or vehicle strike	Clearing is the main impact during construction. There would be limited increased risk from trampling or vehicle strike.	Low
Death through poisoning	No poisons would be used as part of the modified Project. Harmful substances used in construction would all be controlled in accordance with Australian Standards.	Low
Fragmentation	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.	Low

Indirect impacts

Potential indirect impacts associated with construction of the modified Project and the likelihood that they would occur are outlined in **Table 7-6**.

Table 7-6 Assessment of indirect impacts relevant to construction of the modified Project

Impact	Extent of impact as a result of the modification	Impact likelihood
Indirect impacts		
Predation by domestic and/or feral animals	The modified Project is not likely to increase the presence of domestic or feral animals in the local area. Feral animals (e.g. rabbits) are already present.	Low
Loss of shade/shelter	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.	Known
Loss of individuals through starvation	The small amount of habitat to be removed in the modification area is not considered likely to cause loss of individuals through starvation.	Low
Loss of individuals through exposure	Habitat to be removed in the modification area occurs primarily as patchy stands of native groundcover and mid-storey vegetation. Areas of habitat nearby would not be impacted by the modified Project. The modified Project is not considered likely to cause a loss of individuals through exposure.	Low
Edge effects (noise, light, traffic)	The modification would introduce edge effects such as noise and traffic during construction.	Low
Deleterious hydrological changes	The modification would not alter existing flow regimes of any watercourses. Should the transmission connection be installed belowground, the required trench would be excavated through the ephemeral watercourse. The watercourse is ephemeral in nature and as such does not have a constant flow of water. The trench would be backfilled immediately and rehabilitated so that the works would not result in hydrological changes. As such, the modified Project is unlikely to result in deleterious hydrological changes.	None
Weed invasion	Weeds may be introduced or spread at the modification area during construction if weed control protocols are not adhered to. This would be monitored and managed via weed control.	Low
Increased human activity within or directly adjacent to sensitive habitat areas	There are no sensitive habitat areas within the modification area, and human activity during construction of the transmission connection would be minimal.	Known

Operation impact assessment

Direct and indirect impacts

Potential indirect impacts associated with operation of the modified Project and the likelihood that they would occur are outlined in **Table 7-7**.

Table 7-7 Assessment of direct and indirect impacts relevant to construction of the modified Project

Impact	Extent of impact as a result of the Modification	Impact likelihood
Direct impacts		
Death through poisoning	No poisons would be used as part of the modified Project. Harmful substances used during operation and during weed management (if required) would all be controlled in accordance with Australian Standards.	Low
Indirect impacts		
Predation by domestic and/or feral animals	The modified Project is not likely to increase the presence of domestic or feral animals in the local area during operation. Feral animals (e.g. rabbits) are already present.	Low
Deleterious hydrological changes	The modification would not alter existing flow regimes of any watercourses. Should the transmission connection be installed belowground, the required trench would be excavated through the ephemeral watercourse. The watercourse is ephemeral in nature and as such does not have a constant flow of water. The trench would be backfilled immediately and rehabilitated so that the works would not result in hydrological changes. As such, the modified Project is unlikely to result in deleterious hydrological changes.	None
Weed invasion	Weeds may be introduced or spread at the modification area during operation if weed control protocols are not adhered to. This would be monitored and managed via weed control.	Low
Increased human activity within or directly adjacent to sensitive habitat areas	There are no sensitive habitat areas within the modification area, and human activity is unlikely to increase substantially post-construction.	Known

Serious and irreversible impacts

The BC Act imposes various obligations on decision-makers in relation to impacts on biodiversity values that are at risk of SAIL. 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 taken) are serious and irreversible (DPIE 2020b).

No threatened biodiversity at risk of SAIL are known or considered likely to occur in the modification area.

Biodiversity offsets

AGL is proposing to stage the credit offset liability for the modified Project as follows:

- Stage 1 (BESS site)
- Stage 2 (transmission connection).

The ecosystem and species credits required to be offset for each stage have been calculated using the relevant version of the BAM-C. **Table 7-8** provides the area of each stage and the ecosystem and credit requirements of each.

Table 7-8 Biodiversity offset credit obligation

Stage	Area impacted (ha)	Required ecosystem credits	Required species credits
Stage 1	0.31	3	3
Stage 2	0.6	7	7
Total	0.91	10	10

7.2.4 Mitigation and management measures

Section 9.1 presents the management and mitigation measures for the modified Project. Where necessary the management and mitigation measures agreed as part of the approved Project have been updated. In particular updates have been made to the measures relating to biodiversity to account for the potential trenching across the ephemeral drainage line. All other biodiversity measures remain relevant for the modified Project and, alongside the offset obligation, address the impacts discussed in **Section 7.2** and the BDAR in **Appendix B**.

7.3 Aboriginal Heritage

7.3.1 Methodology

An Aboriginal Cultural Heritage Assessment Report (ACHAR) was completed in line with relevant guidelines to support the development application and EIS for the approved Project. As part of the assessment, a field team of two AECOM heritage specialists and RAPs representatives completed the archaeological survey within the Site and transmission connection on Wednesday 20 January 2021. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey.

To support the application for the modification, a separate ACHAR has been produced focusing on the modification area and proposed option to install the transmission connection belowground between the Site and the substation site (refer to **Appendix C**). This ACHAR documents the results of the assessment of the modification and has been compiled with reference to relevant statutory guidelines including Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).

The overarching objectives of this ACHAR are as follows:

- to identify the Aboriginal cultural heritage values of the modification area by way of background research, archaeological survey and test excavation, and consultation with RAPs
- to assess the potential impact of the modification on the identified Aboriginal cultural heritage values of the modification area
- to provide an appropriate management strategy for avoiding or minimising potential harm to the identified Aboriginal cultural heritage values of the modification area
- to compile an ACHAR that will assist in the assessment of the modification application.

Key requirements of the study have been:

- to conduct a search of Heritage NSW's AHIMS register
- to review the landscape context of the modification area, with specific consideration to its implications for past Aboriginal land use
- to review relevant archaeological and ethnohistoric information for the modification area and environments
- to prepare a predictive model for the Aboriginal archaeological record of the modification area
- to undertake an archaeological field investigation, including survey and test excavation

- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the modification area
- to provide Registered Aboriginal Parties (RAPs) with information about the scope of the proposed works and Aboriginal heritage assessment process
- to facilitate a process whereby RAPs can:
 - contribute culturally appropriate information to the proposed assessment methodology
 - provide information that will enable the cultural significance of Aboriginal objects and/or places within the modification area to be determined
 - have input into the development of cultural heritage management options
- to prepare and finalise an ACHAR with input from RAPs.

This section of the Modification Report provides a summary of the ACHAR for the modification.

7.3.2 Existing environment

A search of the AHIMS database undertaken on 25 November 2021 for a 10 x 10 km area centred on the modification area, extending 5 km to the north, south, east and west, resulted in the identification of 51 Aboriginal sites, comprising 41 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site (refer to **Table 7-9**).

Consideration of the location of previously recorded Aboriginal sites indicates that no previously recorded Aboriginal sites are located wholly or partially within the modification area. The closest site, open artefact site “Kanandah 1” (AHIMS #23-4-0640), is located around 390 m to the south of the modification area.

Table 7-9 Site search results (10 x 10 km area)

Site Type	Count	% site type
Open artefact site (i.e., isolated artefacts and artefact scatters)	41	80
Stone quarry	7	14
Hearths	2	4
Resource and gathering site	1	2
Total	51	100

A review of the existing archaeological and environmental context of the modification area suggests that material evidence of past Aboriginal activity within the area is likely to be restricted to flaked stone artefacts and/or heat retainer hearths in surface contexts. Accordingly, key predictions for the modification area’s Aboriginal archaeological record are as follows:

- Considering the extent of past disturbances, identified stone artefacts encountered within the modification area would likely be in disturbed contexts and not *in-situ*
- If present, stone artefacts would most often comprise surface distributions and might be associated with other archaeological remains, including heat retaining hearths
- Stone artefacts are most likely to be identified on eroded land surfaces adjacent to creeks, including ephemeral drainage lines, where levels of visibility are typically higher
- If present, Aboriginal archaeological materials within the modification area will be of mid-to-late Holocene antiquity (~7000 BP to the present day)
- The dominant raw material for flaked stone artefact production within the modification area will be quartz, with silcrete the second most common material
- Flaked stone objects will be dominated by flake debitage items (*sensu* Andrefsky, 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented

- Formal retouched tool types will be poorly represented in stone artefact assemblages.

A two day program of archaeological test excavation was completed across the modification area on 17 and 18 November 2021. A field team of three AECOM heritage specialists and RAP representatives completed the archaeological survey across the modification area. A total of 11 Aboriginal artefacts were identified during the archaeological survey. The artefacts were recorded scattered over an area roughly 5 m x 2 m in size and are considered to comprise a single artefact scatter site designated - BESS-AS1-2021. BESS-AS1-21 has been assessed as of low scientific significance, both on the basis of its contents and also its poor, disturbed condition.

Archaeological test excavation was undertaken in a single campaign with 10 x 0.25 m² test pits excavated at 10 m intervals along the transmission connection corridor. Originally, 17 test pits were proposed at 20 m intervals along the corridor, however, during the archaeological survey significant ground surface disturbances were noted directly adjacent to Transgrid Broken Hill substation. Given the noted constraints, only ten (10) test pits were ultimately excavated within the corridor with this reduction discussed with and supported by RAPs present. No Aboriginal artefacts were identified during the subsurface excavation program.

7.3.3 Impact assessment

The proposed works within the modification area could directly impact BESS-AS1-21. Consideration of the location of the site in relation to the proposed works indicates that it is located partially within the modification area and would therefore be partially impacted (refer to **Appendix C**). However, given the proximity to the modification area, and the potential for inadvertent impacts, it is assumed that the entire site would be impacted.

In order to mitigate the impact of the proposed works on BESS-AS1-21, it is recommended that all surface artefacts present within the boundary of this site be relocated to an area nearby that would not be impacted by the modification. Movement of the artefacts prior to impact is considered to result in a partial loss of value of the site with its original context being destroyed but with the objects themselves not impacted.

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.

7.3.4 Mitigation and management measures

Section 9.1 presents the management and mitigation measures for the modified Project. Where necessary the management and mitigation measures agreed as part of the approved Project have been updated. In particular updates have been made to the measures relating to Aboriginal heritage to account for potential impacts to artefact scatter site BESS-AS1-21. All other Aboriginal heritage measures remain relevant for the modified Project and address the impacts discussed in **Section 7.3** and the ACHAR in **Appendix C**.

7.4 Soils, groundwater and contamination

7.4.1 Methodology

A Detailed Site Investigation and Assessment (DSI) was completed to support the development application and EIS for the approved Project. The purpose of the DSI was to identify contaminants of potential concern, inform future development works, understand existing soil conditions across the approved Project Area (including the modification area) and understand requirements for further investigation and/or management. Potential impacts related to the modification would be similar in nature to those already assessed and approved in the EIS. However, the works to trench and install the transmission connection would require increased soil management.

To support the application for the modification, a desktop assessment of the modification area was completed to understand the existing ground conditions within the modification area and the likely level of assessment required. Information within Chapter 11.0 of the EIS was also referenced to support this assessment.

7.4.2 Existing environment

Topography

The modification area is relatively flat sloping gently down from the Site to the ephemeral drainage line and then back up towards the substation site. The Site is located at approximately 284 to 283 metres Australian Height Datum (AHD).

Geology and soils

According to the 1:250,000 geological sheet, the modification area is located within the Precambrian aged Willyama Complex. The Atlas of Australian Soils indicates that the modification area and surrounds are classified as Sodosols – hilly with small valley plains. Soils within the modification area are characterised as shallow dense loamy soils, shallow calcareous loamy soils, and shallow loams and sand occurring on the hills. Associated are crusty loamy soils and highly calcareous loamy earths on pediments, slopes and in the small valleys.

A review of the Atlas of Australian Acid Sulfate Soils indicates that the modification area and immediate surrounds are categorised as having an extremely low probability (1-5% chance) of acid sulfate soil occurrence.

No naturally occurring asbestos or occurrences of mining subsidence are indicated on or within 500 metres of the Site.

Groundwater

Groundwater resources within the Broken Hill area can be classified into three groups:

- Perched groundwater present in the thin veneer of Quaternary sediments overlying the Proterozoic bedrock formations
- Groundwater present in thick sequences of colluvial sediments that have accumulated on downthrown fault blocks along the western margin of the Barrier Ranges
- Groundwater present within structural features of the Proterozoic bedrock.

Of these groups, Quaternary sediments overlying the Proterozoic bedrock formations are located beneath the modification area.

One ephemeral watercourse is located within the Project Area; the upper portion of a 1st order ephemeral tributary of Kelly's Creek. The central channel of Kelly's Creek is located approximately 5.5 km south of the modification area. The channel drains in a southerly direction. It is likely that groundwater also drains in a southerly or south-easterly direction.

A review of the NSW Department of Primary Industries – Office of Water dataset indicates that there are no registered groundwater bores located within the modification and 13 registered groundwater bores within one kilometre of the modification area. Based on the characteristics of these groundwater bores, it was identified that there may be potential for shallow groundwater to be present at the modification area at less than two metres below ground level.

7.4.3 Construction impact assessment

Ground disturbance

As detailed in the construction methodology (**Chapter 4.0 Modification**), construction works could include earthworks, including trenching, for a distance of about 376 metres. Excavations within the modification area would be to a maximum of 1.3 metres deep. No excavation would be required within the substation site.

Installation of the transmission connection below ground would involve the excavation and stockpiling of soil. This soil is likely to be used as backfill at the broad location where it is excavated however it may need to be transported within the modification area. If not adequately managed, earthworks, stockpiling and transportation of spoil could potentially have the following impacts:

- Erosion of exposed soil and stockpiled materials
- An increase in sediment loads entering the drainage line within the site

- Dust generation from excavation and vehicle movements over exposed soil.

There is a low risk of encountering acid sulfate soils during the undergrounding of the transmission connection given that the probability of acid sulfate soils in the area is low.

The management and mitigation measures for the modification would remain consistent with the measures approved as part of the SSDA (refer to **Section 9.1**). The approved Project considered potential impacts related to earthworks, stockpile management and erosion and sediment control and are therefore appropriate to manage the potential impacts related to the trenching activities. Specifically, the management of ground disturbance impacts would be managed through the preparation and implementation of a Soil and Water Management Plan (refer to Measure C2 in **Table 9-1**). In addition, a measure to rehabilitate the land that may be disturbed during construction of the transmission connection to broadly pre-development condition has been included to help mitigate erosion risks.

Soils and contamination

The modification area is located on land that has not previously been developed. Desktop investigations completed for the approved Project suggested that it was unlikely that contamination would be present along the route of the transmission connection. Nevertheless as a precaution, sampling would be undertaken for excavations along the transmission connection to allow for waste classification. Potential contamination encountered would be managed in line with an unexpected finds measure for contamination which would be included with the Construction Environment Management Plan (CEMP) for the modified Project. Accidental spills and leaks of fuels and oils from plant and equipment during construction would also be managed through the CEMP. These measures were agreed as part of the approved Project (refer to **Section 9.1**).

Groundwater

Given that ground disturbance works could be up to 1.3 metres below ground level to allow for the transmission connection across the modification area, it is unlikely that groundwater would be intercepted during construction. Therefore, the proposed construction works are not anticipated to result in impacts to groundwater. The management and mitigation measures for the modification would remain consistent with the measures approved as part of the approved Project (refer to **Section 9.1**).

7.4.4 Operation impact assessment

Once operational, the transmission connection is unlikely to result in impacts to soils, groundwater or pose a contamination risk. Areas disturbed during construction of the transmission connection would be rehabilitated to broadly their pre-development condition.

7.4.5 Mitigation and management measures

Section 9.1 presents the management and mitigation measures for the modified Project. Where necessary the management and mitigation measures agreed as part of the approved Project have been updated. In particular, updates have been made to the measures relating to rehabilitating land disturbed during construction of the transmission connection. All other soil, groundwater and contamination measures remain relevant for the modified Project and address the impacts discussed in **Section 7.4**.

7.5 Surface water, flooding and water use

7.5.1 Methodology

A surface water, flooding and water use assessment was prepared to support the development application and EIS for the approved Project. The purpose of this assessment was to determine the potential surface water, flooding and water use impacts during construction and operation of the approved Project. While the assessment accounted for the impacts of the entire Project Area, focus was placed on the Site as the majority of the surface water, flooding and water use impacts were anticipated to occur as a result of construction and operation of the BESS.

To support the application for the modification, a desktop assessment was completed to understand the existing surface water and flooding conditions for the modification area and the likely potential impacts of the modification. The information in Chapter 11.0 and Chapter 14.0 of the EIS was used to support this assessment.

7.5.2 Existing environment

The only surface water feature of note within the modification area is the unnamed ephemeral drainage line located between the Site and the substation site (1st order stream). The modification area crosses part of the drainage line between the Broken Hill Railway Line and Pinnacles Road. The upstream catchment contributing to flow along the ephemeral drainage line at this point is estimated to be in the order of 2.7 square kilometres and extends past the northern railway line and all the way up to Wills Street.

The ephemeral drainage line lacked surface water during the survey and is dry for the majority of the year. It only conveys water during or following rainfall events. While there is a large upstream catchment that contributes to flow within the ephemeral drainage line, it does not generate enough runoff to maintain a continuous stream of water, namely due to the arid weather conditions at Broken Hill.

Surface water moving along the ephemeral drainage line is directed in a southerly direction through existing culverts under Pinnacles Road. The drainage line then continues in a southerly direction and eventually feeds into Kelly's Creek (approximately 3.5 kilometres south of the proposed transmission connection).

The land around the drainage line is relatively flat with a slight increase in gradient (approximately 1%) towards the Site and substation site. There are no formalised channels directing flow towards the ephemeral drainage line. Surface water runoff from the area would generally move as shallow sheet flow until it reaches the ephemeral drainage line.

More details on the ephemeral drainage line and the wider stormwater drainage system is provided in Appendix G of the EIS.

7.5.3 Construction impact assessment

The option of installing the transmission connection belowground would require the cables to be placed in an excavated trench. The excavation would be a maximum of 1.3 m deep and 1.0 m wide (depending on the location). Soil would be excavated and stored close to the trench before being used as backfill. The trench would be excavated and backfilled progressively.

There are two main surface water impacts that could result from the trenching and related activities. These potential impacts would be temporary and limited to installation of the transmission connection. These include:

1. Impacting the quality of water within the watercourse and downstream receptors by:
 - Increasing sediment mobilisation through, for example, vegetation removal, trenching or stockpiling.
 - Spills from construction equipment or vehicles.
2. Obstructing or altering flow paths with, for example, excavations, construction equipment, materials or temporary stockpiles.

A number of mitigation and management measures were identified as part of the approved Project. These measures provided mitigation approaches for the management of spills, erosion and sediment control and surface water flow diversions. In particular a measure to produce a SWMP in accordance with *Managing Urban Stormwater: Soils and construction – Volume 1* (the Blue Book) (Landcom, 2004) was agreed. This SWMP would also include specific measures as identified in the approved Project documentation.

Trenching across the modification area was not considered as part of the approved Project. Therefore, the following measures have also been identified to mitigate potential impacts and would be included in the SWMP:

- 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 hours trenches would be backfilled and surface soils stabilised.

- 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 ensure
 - ensure trench backfilling restores the channel shape and bed level so as to maintain the existing hydraulic capacity of the watercourse
 - outline proposed vegetation planting to help stabilise the soils where excavations have occurred.

These measures have been included in a consolidated set of mitigation and management measures in **Section 9.1**.

7.5.4 Operation impact assessment

Due to the flat longitudinal grade, flat banks, low flows and velocities, it is unlikely that there would be any significant erosion or bank stability issues, provided that the trench is backfilled and compacted to a suitable standard. The rehabilitation plan provided as part of the SWMP would require a maintenance period to ensure no erosion, bank stability or vegetative growth issues resulting from the construction works. This plan would also form part of the operational management procedures during this maintenance period.

It is considered extremely unlikely that the modification would impact the hydrologic or hydraulic properties of the watercourse as the cables will either be belowground or strung between transmission poles. The transmission cables would be protected where they cross the ephemeral drainage line from tunnel erosion using conduits and/or belowground concrete protection.

7.5.5 Mitigation and management measures

Section 9.1 presents the management and mitigation measures for the modified Project. Where necessary the management and mitigation measures agreed as part of the approved Project have been updated. In particular updates have been made to the measures relating the trenching activities and rehabilitating land disturbed during construction of the transmission connection. All other soil, groundwater and contamination measures remain relevant for the modified Project and address the impacts discussed in **Section 7.5**.

7.6 Other matters

7.6.1 Non-Aboriginal Heritage

Assessment methodology

A non-Aboriginal heritage assessment was completed to support the development application and EIS for the approved Project. This assessment involved:

- Identifying non-Aboriginal heritage items with the potential to be impacted by the approved Project, by undertaking a search of the statutory and non-statutory historic registers and lists on 29 January 2021
- Assessing the potential impacts of the Project on non-Aboriginal heritage values and identified items during construction and operation
- Identifying management measures to address potential impacts to non-Aboriginal heritage.

To support the application for the modification, an updated desktop search of relevant heritage registers was undertaken to inform this Modification Report, specifically of the following data sources were reviewed:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- Register of the National Estate (non-statutory)
- Australian Heritage Database
- NSW State Heritage Register
- Broken Hill LEP 2013.

Similar to what was presented in the EIS the updated search returned the results provided in **Table 7-10**.

Table 7-10 Historic heritage register and list searches

Heritage register	Results	Location
NSW State Heritage Register (SHR)	None	N/A
Broken Hill LEP	None	N/A
World Heritage List	None	N/A
National Heritage List	City of Broken Hill	Entire LGA
Commonwealth Heritage List	None	N/A
Register of National Estate	None	N/A
EPBC Protected Matters Search Tool	None	N/A
Roads and Maritime Heritage and Conservation Register	None	N/A

Existing environment

One heritage item is relevant to the modification, namely the City of Broken Hill, which comprises the entire Broken Hill City Council LGA. The City of Broken Hill was included on the National Heritage List in 2015. The significance of the City of Broken Hill broadly relates to its role in creating wealth in Australia from its continuing mining operations, the local community's connection with Broken Hill, its outback landscape, the planned design and landscaping of the town, physical remainders of its mining origins, and its history as a place of technical achievement and research.

No other heritage items were identified within or in the immediate vicinity of the modification area. The closest individually listed heritage item is located about 800 metres to the south-east of the modification (Old Broken Hill City Abattoir, an item of local significance listed under Schedule 5 of the Broken Hill LEP).

Impact assessment

The construction of the modification would not result in direct impacts to heritage values and significant elements of the City of Broken Hill listing such as the landscaping of the town, regeneration areas and reminders of its mining origins. Due to the industrial setting of the modification, visual impacts to the listing would also be negligible if the transmission connection was to be installed belowground (refer to **Section 7.6.5**). The modification area is unlikely to contain items of non-Aboriginal heritage value. As such, no impacts to non-Aboriginal heritage are expected. Management of potential impacts to non-Aboriginal heritage would remain consistent with the measures provided in Chapter 18 of the EIS; specifically measure NAH1 (refer to **Section 9.1**).

7.6.2 Noise and Vibration

Assessment methodology

A Noise and Vibration Impact Assessment (NVIA) was prepared to support the development application and EIS for the approved Project. The purpose of the NVIA was to assess the potential noise and vibration impacts during construction and operation of the approved Project. The noise and vibration impact assessment involved:

- Determining the existing background noise levels at the closest residential receiver location by applying minimum noise levels provided in the NSW Noise Policy for Industry (NPfI)
- Determining construction noise management levels (NMLs) and vibration limits applicable to identified sensitive receivers
- Establishing representative construction scenarios, locations, working times and duration of activities that would apply to construction of the Project
- Assessing the likely construction noise and vibration levels in accordance with the Interim Construction Noise Guidelines (ICNG) (DECC, 2009) and Assessing Vibration: A Technical Guideline (AVTG) (DEC, 2006), respectively. This included noise modelling of construction scenarios to predict noise levels at nearby receivers, and comparing the results to NMLs to determine whether they would be exceeded
- Establishing operational scenarios applicable to the Project
- Assessing the likely operational noise and vibration impacts of the Project in accordance with the NPfI. This included noise modelling of operational scenarios to predict noise levels at nearby receivers, and comparing the results to project noise trigger levels to determine whether they would be exceeded
- Assessing the likely noise impacts of additional traffic during construction and operation on identified sensitive receivers in accordance with the Road Noise Policy (RNP) (DECCW, 2011)
- Identifying management and mitigation measures to manage the predicted noise and vibration impacts during construction and operation of the Project.

The NVIA for the approved Project was used to help determine the potential noise impacts the modification may have on surrounding receivers. This section of the Modification Report provides a summary of the noise and vibration impacts associated with the modification.

Existing environment

The existing acoustic environment around the modification area is dominated by road and rail traffic and industrial related sources. The nearest residential receiver is a rural residence located approximately 1 kilometre from the modification area.

Given that the majority of the residential receivers are located on the edge of the Broken Hill city centre and are surrounded by vacant land, the minimum noise levels provided in the NPfI were adopted for this assessment. These noise levels (rating background levels) are presented in **Table 7-11**.

Table 7-11 Rating background levels (RBL)

Receiver	Minimum assumed rating background noise level (RBL), L _{A90} dB(A)					
	Day 7am 6pm		Evening 6pm 10pm		Night 10pm 7am	
Residential receivers	35		30		30	

The RBLs provided in **Table 7-11** have been compared to previous background noise logging levels undertaken at other remote rural areas in NSW and are considered to be representative. This approach is considered conservative as there is potential that the existing environment is affected by industrial noise sources and the existing RBLs could be higher than presented in **Table 7-11**.

Impact assessment

The noise assessment presented within the EIS assumed for the transmission connection that the equipment outlined in **Table 7-12** would be used and would be operating concurrently. This conservative assessment concluded that the installation of the transmission connection above ground would not exceed the noise management levels at residential receivers and that none of these receivers would be highly noise affected.

The modification involves potentially installing the transmission connection below ground, however, the equipment required to complete these works and time of day when these works would be completed are similar to that presented in the approved EIS. As the noise assessment within the EIS assumed that the equipment outlined in **Table 7-12** would be operating concurrently, it is conservative enough to account for this equipment being used to install the transmission connection belowground. On this basis, it can be concluded that noise impacts from the construction of the modified Project would be consistent with those assessed as part of the approved Project. As such, it can be concluded that the installation of the transmission connection below ground would not exceed the noise management levels at residential receivers and that none of these receivers would be highly noise affected.

Table 7-12 Transmission connection construction equipment

Phase	Equipment / Activity	Percentage time on	'A' Weighted SWL dB(A)
Transmission connection	Excavators	100	99
	Generators	100	94
	Compactors and rollers	100	107
	Dump trucks	100	114
	Backhoe	100	97
	Cranes	100	105
	Concrete saws and grinders	100	115
	Road trucks	100	108
	Overall	-	119

For non-residential receivers, the original assessment as presented in the EIS remains consistent, that one exceedance within the 11-20 dB band at the Transgrid substation during the transmission connection phase is predicted. Works to complete the revised transmission connection would progressively move along the transmission connection. In context to the original assessment as presented in the approved EIS, impacts to workers within the substation continue to be expected to last for a period of a few weeks. Notwithstanding, Transgrid would be consulted with to manage potential noise impacts and/or complaints. Potential construction noise and vibration impacts of the modification would be limited and manageable with the implementation of standard mitigation measures (refer to measures NV1 and NV2 in **Table 9-1**). These measures include the preparation of a Construction Noise and Vibration Management Plan (CNVMP) that would form part of the CEMP to manage potential impacts during construction. The management and mitigation measures as they relate to noise and vibration impacts have been summarised in **Chapter 9.0**.

The operation of the transmission connection would not change the conclusions of the operational noise assessment for the approved Project. As such, no additional operational impacts are expected.

7.6.3 Transport and access

Assessment methodology

A Traffic and Access Impact Assessment (TAIA) was prepared to support the development application and EIS for the approved Project. The TAIA involved:

- Establishing the existing traffic and access conditions near the Project Area, as well as the active transport and public transport networks near the Site. This was informed by the following:
 - A desktop assessment based on available aerial photography and other GIS mapping information
 - Traffic volumes obtained from Transport for NSW (TfNSW) permanent classifier located on the Barrier Highway
 - Broken Hill Solar Power Plant Environmental Assessment report (Volume 2) prepared by SKM in October 2012
- Confirming the location of access points, anticipated vehicle movements and likely routes during the construction of the Project
- Undertaking a qualitative impact assessment of the potential impacts of the Project on the local traffic and transport environment during construction and operation of the Project. Given that traffic volumes within the vicinity of the Project Area during peak construction periods are anticipated to be low, it was concluded that a qualitative assessment would be appropriate to assess the road network performance with the Project, and network modelling was therefore not required
- Identifying the likely impacts or access constraints for heavy vehicles
- Identifying mitigation measures for managing potential impacts should they be required for the Project.

The TAIA was used to determine the potential traffic impacts that may arise as a result of the modification. This section of the Modification Report provides a summary of the traffic and access impacts associated with the modification.

Existing Environment

Consistent with the approved Project, key roads used to access the modification area include:

- **Pinnacles Road** – a local east-west road connecting Pinnacles Place to Kanandah Road in the east. To the west it stretches as far as Pine Creek, about 11 kilometres west of Kanandah Road. It has an undivided carriageway providing one lane in each direction. On-road parking is not provided. There is a verge on the southern side of the road with potential to provide off-road parking. There are limited pedestrian footpaths provided along the road.
- **Pinnacles Place** – a local north-south loop road adjacent to the eastern boundary of the modification area. This road provides access to the BESS site and various other industrial land uses. It connects to Pinnacles Road to the south. The road has one lane in each direction with an undivided carriageway. The road provides on-street parking. No pedestrian footpaths or crossings are provided on Pinnacles Place.

There are no train stations or bus stops in the immediate vicinity of the modification area. There are limited walking and cycling facilities in the immediate vicinity of the modification area.

Construction and operation impact assessment

Similar to the original assessment as presented in the EIS, the installation of the transmission connection belowground would not generate additional traffic or create additional access impacts to that assessed in the EIS. During construction, vehicles would continue to access the modification area, including the substation site from Pinnacles Road.

Traffic generated by construction vehicles, including construction trucks and construction workers, is expected to be low given the nature of the construction of the modification. The vehicle numbers required for the modification are not anticipated to exceed the numbers assessed in the EIS. These were:

- Up to 50 construction workers per day during peak construction periods to facilitate the construction works (i.e., up to 50 light vehicles per day during the peak construction year)
- Up to 20 heavy vehicles per day on average during the construction period.

The vehicle numbers for the construction of the modified Project would not exceed these numbers. On this basis it can be concluded that that potential traffic impacts from the construction of the modified Project would be consistent with those assessed as part of the approved Project.

During the operation of the BESS, the transmission connection would be installed and vehicle movement associated with the workforce are not anticipated to access the modification area on a regular basis. Vehicle access for the transmission connection maintenance would be limited, however this would be on an as-needed basis. As such, traffic generation would be low and impacts on the surrounding road network would be negligible. Management of potential traffic impacts related impacts will remain consistent with the measures agreed as part of the approved Project, specifically measure T1. The management and mitigation measures relating to traffic and access impacts have been summarised in **Chapter 9.0**.

7.6.4 Bushfire

Assessment methodology

A Bushfire Threat Assessment (BTA) was prepared to support the development application and EIS for the approved Project. The assessment was completed with reference to the bushfire risk assessment process recommended by the Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committee (BFCC, 2008). The assessment methodology follows the procedures and considerations of *Australian Standard AS/NZS ISO 31000:2018 Risk management – Guidelines*. Planning for Bush Fire Protection 2019 (PBP) (NSW Rural Fire Service, 2019) was also applied to identify relevant bushfire protection measures. The methodology for this assessment consisted of an overview of the existing environment around the modification. Chapter 15.0 and Appendix I of the EIS was referenced to assess bushfire risks associated with the modification.

Existing Environment

The modification area slopes gently into an ephemeral watercourse that drains north to south. The gradient is less than 1.5 degrees on either side of the watercourse and, therefore, falls within the Planning for Bush Fire Protection (PBP) slope class of 'downslope 0-5 degrees' (NSW Rural Fire Service, 2019).

The majority of the modification area is mapped as Vegetation Category 3 land and partly mapped as the vegetation buffer for Category 3 land. Category 3 refers to land considered to be at a medium risk for bushfire and is surrounded by a 30 metre vegetation buffer (NSW RFS, 2019).

Construction and operation impact assessment

During construction of the modification, construction equipment and vehicles may have the potential to create a fire risk through the generation of sparks or heat, or machinery faults, which may ignite dry combustible material, if present. Other potential sources of ignition may arise from accidental fires from human related activities. This would be largely avoided through appropriate use and maintenance of equipment and machinery within the modification area. Potential accidental spills of fuel, oil and flammable liquid may also increase the risk of bushfire during construction, particularly in proximity to dry combustible materials. Construction works would be managed to avoid the risk of accidental leaks or spills occurring or managing the clean-up of such spills quickly.

Consistent with the assessment within Chapter 15 of the EIS, the modification would have a 'low' risk of bushfire impact during construction and once operational. In relation to the risk of bushfires during construction, these would be managed by:

- Banning all on-site fires

- Protecting or removing flammable materials from high-risk areas of the modification area
- Adhering to any declarations of total fire ban
- Implementing work practices to control and stop or minimise “hot” work during periods of extreme heat or high to severe fire condition.

Once operational, the transmission connection is unlikely to pose a bushfire risk. Installing the transmission connection belowground eliminates risks of hazardous weather conditions such as lightning strikes, which are common bushfire triggers caused by overhead transmission lines.

The risk of bushfire impact to the modification area and fire initiating and spreading from the modification area has been assessed as low. Notwithstanding, bushfire protection measures would be implemented to address residual risks, minimise bushfire impact on the proposed assets, and to help implement a ‘measures in combination’ approach as required by *Planning for Bush Fire Protection 2019*. The proposed measures are consistent with what has been proposed and adopted in Chapter 18 of the EIS, specifically measures BF2 to BF5. The management and mitigation measures as they relate to potential bushfire impacts have been summarised in **Chapter 9.0**.

7.6.5 Visual impact

Assessment methodology

A desktop Visual Impact Assessment (VIA) was completed as part of the EIS for the approved Project. The VIA involved:

- Identifying the existing visual conditions at the Project Area and surrounds, including sensitive receivers
- Undertaking a desktop study to identify the approved Project’s level of visibility, its ability to be accommodated within the surrounding landscape, and consequential potential visual impacts during construction and operation. Photographs of the Project Area were used in this process
- Assessing potential visual impacts during the construction and operation of the approved Project (magnitude vs. sensitivity)
- Identifying management and mitigation measures to minimise the potential impacts to visual amenity.

As the modification area is located in an existing industrial area, no private receptors or public vantage points that have the potential to be impacted visually by the modification were identified. The potential visual impact of the modification would result primarily from the combination of two factors:

- The level of visibility, or extent to which the modification would be visible, from surrounding areas
- The degree of visual contrast between the modification and the capability of the surrounding landscape to visually accommodate them.

The methodology for the previously prepared VIA was used to determine the visual impacts that may arise as a result of the modification. This section of the Modification Report provides a summary of the potential visual impacts associated with the modification.

Existing Environment

The modification area is within a relatively flat landscape, which is mostly dominated by open land and industrial operations. The modification area is located approximately two kilometres west of the Broken Hill city centre in a semi-rural/industrial area.

Industrial land uses are located adjacent to and around the modification area. North of the modification area is an Essential Energy substation. Further north is the Adelaide-Broken Hill Railway and the Broken Hill Community Recycling Centre. Warehouse and shed structures are present to the south of the Site and east across Pinnacles Place, including freight storage and handling yards.

Limited flora and fauna habitat are present in this area, which appears to be in both a degraded and low condition. Several existing transmission and distribution lines are present in the surrounding landscape, including to the immediate west of the modification area, and to the north following the railway line, and south along Pinnacles Road. There are no crossings within the vicinity of the modification area on

Pinnacles Road, and limited pedestrian footpaths. The nearest residential property is located approximately 1 kilometre to the south of the modification area. The nearest residential area is located about 1.65 kilometres north east of the modification area along Ryan Street.

Construction and operation impact assessment

Construction activities and equipment would be temporarily visible to road users using Pinnacles Road. Construction vehicles may also be seen accessing the modification area via Pinnacles Road. Due to the temporary nature of the construction activities and the transient nature of passing receptors on Pinnacles Road, the significance of visual impacts would be low.

The potential undergrounding of the transmission connection would mean that this part of the Project would result in no visual impacts during operation. Overall low to negligible visual impacts are expected to result from the construction and operation of the modified Project. No additional management and mitigation measures are proposed outside those agreed as part of the approved Project, and presented in **Chapter 9.0**.

7.6.6 Social and economic

Assessment methodology

A Social Impact Assessment (SIA) was prepared as part of the EIS. This SIA has addressed the direct and indirect impacts and benefits of the approved Project by considering:

- Local amenity, including traffic, air quality, noise and the landscape and visual environment
- Property and land use within both the existing and future context
- A broad consideration of business impacts in the context of surrounding industry
- Community identity, values and cohesion
- Social impacts, including amenity, community identity and cohesion
- A broad consideration of economic consequences.

The SIA was used to inform the potential social-economic impacts the modification may cause on the surrounding environment. This section of the Modification Report summarises the socio-economic impacts associated with the modification.

Existing Environment

No changes to the existing socio-economic environment have occurred since consent of SSD-11437498. As such, the information presented in the EIS and other approved Project documentation remains relevant for the modification.

Construction and operation impact assessment

Amenity impacts have been assessed in the following sections:

- **Section 7.6.2** – Noise and Vibration
- **Section 7.6.3** – Transport and access
- **Section 7.6.5** – Visual impact
- **Section 7.6.8** – Air Quality.

Consistent with the approved Project, there would be potential economic benefits associated with the construction of the modified Project, including job creation (up to 50 positions), which would encourage the generation of income within the local and wider community. Workers, supplies and services would be sourced locally where feasible.

Once operational, the modification would facilitate the overall development of the approved Project to provide energy support to the town of Broken Hill. The management and mitigation measures summarised in Chapter 18 of the EIS, specifically measures SE1 to SE3 remain consistent and would be implemented as part of this modification. These measures are reproduced in **Chapter 9.0**

Management and mitigation measures.

7.6.7 Waste

Assessment methodology

A qualitative desktop assessment has been carried out to identify waste types, potential impacts, and appropriate management measures associated with the modification. The waste types estimated in this section of the Modification Report are indicative and have been identified for the purpose of determining potential waste management options.

Existing Environment

The modification is located between the Site and the substation site. No waste storage facilities are located on the modification area. The nearest waste facility is the Broken Hill Community Recycling Centre, located approximately one kilometre north of the modification area.

Construction and operation impact assessment

Construction of the modification has the potential to produce the following waste streams:

- Excess spoil through site clearance activities, trenching and earthworks
- Vegetation from the removal of shrubs
- Packaging materials associated with items delivered to modification area, such as pallets, crates, cartons, plastics and wrapping materials
- Wastes produced from the maintenance of construction equipment and machinery, including liquid wastes from cleaning, repairing and maintenance
- General domestic wastes, such as paper, litter and food wastes.

For excavated soils, these would be re-used as backfill where possible. Where not possible, this material would be sent offsite for disposal. Fuels, lubricants and chemicals would be disposed of, off-site at a licenced facility.

Once operational it is unlikely that the transmission connection would generate waste on a regular basis. Some waste may be generated during maintenance activities; however, these would be consistent with the waste types assessed as part of the approved Project.

During both construction and operation, potential impacts related to waste management would be managed in line with the management and mitigation measures presented in Chapter 18 of the EIS, specifically measures W1 and W2. These measures would also be implemented for the modified Project and are presented in **Chapter 9.0**.

7.6.8 Air quality

Assessment methodology

A qualitative assessment of air quality assessment was prepared as part of the EIS. The preparation of the AQA involved:

- Reviewing the legislation for air pollution and air quality in NSW
- Identifying potential air pollution generating activities during construction and operation
- Describing the proposed management techniques for key air pollutants during construction and operation.

The assessment was used to determine the potential air quality impacts that may arise as a result of the modification. This involved:

- Identifying potential air pollution generating activities during construction and operation
- Describing the proposed management techniques for key air pollutants during construction and operation.

This section of the Modification Report provides a summary of the air quality impacts associated with the modification.

Existing Environment

Following a review of Broken Hill Council's DA tracker and aerial imagery, no notable changes to the existing air quality around the modification area have occurred since the Project was approved. As such, the information presented in Section 17.5 of the approved EIS remains relevant for the assessment of the modification.

The background air quality at the modification area is characterised through ambient monitoring undertaken by DPE at Broken Hill. The closest monitoring station to the modification area is the Broken Hill Bureau of Meteorology monitoring site at Broken Hill Airport, approximately 4.5 kilometres south-east of the modification area. This station measures a range of pollutants relevant to this study including:

- Total Suspended Particles (TSP)
- Fine particles as PM_{2.5}
- Fine particles as PM₁₀.

Data from the Broken Hill monitoring station have been extracted from the DPE online data portal and summarised in **Table 7-13**.

Table 7-13 Broken Hill Ambient Monitoring Data Summary

Pollutant	Averaging Period	Concentration (µg/m ³)		
		1 Jan 2019	1 Jan 2020	1 Jan 2021
TSP	One-hour average	24	24	4
PM _{2.5}	One-hour average	N/A	11	1
PM ₁₀	One-hour average	N/A	22	3

The air quality within Broken Hill is generally considered to be good. This is due to the predominance of rural land uses, low population density and limited number of large urban centres.

Construction and operation impact assessment

During the construction phase, dust is likely to be generated during the trenching and backfilling activities, as well as from vehicle movement on unsealed roads during dry weather. Dust emissions could be generated from vehicles transporting workers to and from the modification area, trucks delivering construction materials and machinery, such as excavators, graders and diesel generators.

The temporary nature of the construction activities, the location of the modification area within an industrial zone, and the distance of the nearest residential receiver at 1 kilometre, potential air quality impacts during the construction phase would be manageable through the implementation of standard dust suppression methods. Specifically, the management and mitigation measures presented in Chapter 18 of the EIS, specifically measure AQ1, will remain consistent and would be implemented during construction of the modified Project. This measure is presented in **Chapter 9.0 Management and mitigation measures**.

Once operational, air quality impacts associated with the modification would be negligible.

7.6.9 Cumulative impacts

Although some projects have been identified as having the potential to result in cumulative impacts if constructed concurrently or consecutively with the approved Project, the construction timeframes of these projects have not been confirmed. Despite this, taking into consideration the residual environmental impacts of the modified Project (following the implementation of management and mitigation measures), there would be limited potential for cumulative environmental impacts to occur.

8.0 Conditions of Consent

The conditions of consent provided in SSD-11437498 (8 September 2021) were reviewed based on the outcomes of the assessments within this Modification Report to determine their relevance to the modification. **Table 8-1** identifies which conditions are relevant and, if so, where a condition requires updating. The precise wording of the revised conditions will be discussed with DPE and relevant stakeholders following exhibition of the Modification Report and review of submissions that may be received.

Table 8-1 Relevant conditions of consent review

Condition No.	Description	Comment
Schedule 2		
Schedule 2, Condition 1	Obligation to minimise harm to the environment	Relevant – no change
Schedule 2, Condition 2	The applicant must generally carry out the development in accordance with the EIS and the conditions of this consent	This condition may need to be updated to include reference to this modification report.
Schedule 2, Condition 3	If there is an inconsistency between the above documents (condition 2) the most recent document must prevail to the extent of the inconsistency	Relevant – no change
Schedule 2, Condition 4	The applicant must comply with any requirements of the Planning Secretary arising from the Department's assessment of any strategies, plans or correspondence, among others.	Relevant – no change
Schedule 2, Condition 5	The applicant may upgrade the battery storage and/or ancillary infrastructure on site provided these upgrades remain within the approved development footprint of the site	This modification provides the option to install the transmission connection from the Site to the substation site belowground, instead of above ground via a revised alignment. Refer to Appendix B.
Schedule 2, Condition 6	The applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures are constructed in accordance with the relevant requirements of the <i>Building Code of Australia</i> .	Relevant – no change
Schedule 2, Condition 7	The applicant must ensure that all demolition work on site is carried out in accordance with AS2601-2001 or its latest version	Relevant – no change
Schedule 2, Condition 8	Unless the applicant and the applicable authority agree, the applicant must repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development.	Relevant – no change
Schedule 2, Condition 9	The applicant must ensure that all plant and equipment used on Noted, or in connection with the development is maintained and operated in a proper and efficient manner.	Relevant – no change
Schedule 3		
Schedule 3, Condition 1	The battery storage facility or system associated with the development must not exceed a total delivery capacity of 50MW or a storage capacity of 100MWh.	Relevant – no change

Condition No.	Description	Comment
Schedule 3, Condition 2	The applicant must ensure that the development does not generate: • More than 20 heavy vehicles a day on the public road network during construction, upgrading and decommissioning • Over-dimensional vehicle movements during construction, upgrading and commissioning, on the public road network. The length of any vehicles (excluding over dimensional vehicles) used for the development does not exceed 26-metres. Unless the Planning Secretary agrees otherwise.	Relevant – no change
Schedule 3, Condition 3	The applicant must keep accurate records of the number of over-dimensional and heavy vehicles entering or leaving the site each day for the duration of the project.	Relevant – no change
Schedule 3, Condition 4	All heavy vehicles associated with the development must travel to and from the site via Pinnacles Place via, Pinnacles Road, Kanandah Road, Creedon Street and the Barrier Highway.	Relevant – no change
Schedule 3, Condition 5	All vehicles associated with the development must enter and exit the site via the preferred site access point on Pinnacles Place, except for vehicles associated with works at the Transgrid substation, which may be accessed from the site access point on Pinnacles Road, as identified in Appendix 3.	Access for the construction of the modification would be facilitated via Pinnacles Road. Refer to Section 4.2.7 .
Schedule 3, Condition 6	Unless the Planning Secretary agrees otherwise, prior to commencing construction the applicant must upgrade the site access point on Pinnacles Place as identified in Appendix 1, to the satisfaction of Council.	Relevant – no change
Schedule 3, Condition 7	The applicant must undertake an independent dilapidation survey in consultation with the relevant Roads Authority, to the satisfaction of the Planning Secretary	Relevant – no change
Schedule 3, Condition 8	The applicant must ensure: a. The internal roads are constructed as all-weather roads b. The capacity of the existing roadside drainage network is not reduced c. All vehicles are located and unloaded on site, and enter and leave the site in a forward direction wherever practicable, and d. Vehicles leaving the site are in a clean condition, with loads appropriately covered or contained, to minimise dirt being tracked onto the sealed public road network.	Relevant – no change
Schedule 3, Condition 9	Prior to commencing site access works, the Applicant must prepare a Traffic Management Plan for the development in consultation with TfNSW and Council and to the satisfaction of the Planning Secretary.	Relevant – no change

Condition No.	Description	Comment
Schedule 3, Condition 10	The applicant must not clear any native vegetation or fauna habitat located outside the approved disturbance areas described in the EIS.	The revised transmission alignment subject to this modification seeks to modify the approved disturbance footprint. No vegetation is proposed to be removed outside of the revised disturbance footprint.
Schedule 3, Condition 11	Prior to carrying out any development that could directly or indirectly impact the biodiversity values requiring offset, the applicant must retire biodiversity credits of a number and class specified in Table 1 and Table 2.	Pursuant to the approved staging of the development (DPIE, 2021). Table 1 under Schedule 3, Condition 11 is to be modified to be consistent with Table 7-8 .
Schedule 3, Condition 12	Prior to commencing construction, the applicant must prepare a Biodiversity Management Plan for the development in consultation with BCS, and to the satisfaction of the Planning Secretary.	Relevant – no change
Schedule 3, Condition 13	Unless the Planning Secretary agrees otherwise, the applicant may only undertake road upgrades, construction, upgrading or decommissioning activities between: • 7am to 6pm Monday to Friday • 8am to 1pm Saturdays • At no time on Sundays and NSW public holidays	Relevant – no change
Schedule 3, Condition 14	The applicant must: a. Minimise the noise generated by any construction, upgrading or decommissioning activities on site in accordance with the best practice requirements outlined in the <i>Interim Construction Noise Guideline</i> (DECC, 2009), or its latest version, and b. Ensure that the noise generated by the operation of the development during the night does not exceed 35 dB(A) LAeq, 15 min to be determined in accordance with the procedures in the NSW Noise Policy for Industry (EPA 2017) at any non-associated residence.	Relevant – no change
Schedule 3, Condition 15	The applicant must minimise the dust generated by the development.	Relevant – no change
Schedule 3, Condition 16	The applicant must: a. Minimise the off-site visual impacts of the development, including the potential for any glare or reflection b. Ensure the visual appearance of all ancillary infrastructure (including paint colours) blends in as far as possible with the surrounding landscape, and c. Not mount any advertising signs or logos on site, except where this is required for identification or safety purposes.	Relevant – no change

Condition No.	Description	Comment
Schedule 3, Condition 17	The applicant must minimise the offsite lighting impacts of the development and ensure that any external lighting associated with the development complies with AS/NZS 428:2019.	Relevant – no change
Schedule 3, Condition 18	The applicant must ensure the development does not cause any direct or indirect impacts on the Aboriginal heritage items located outside the approved development footprint.	Relevant – no change
Schedule 3, Condition 19	Prior to carrying out any development the application must prepare a Heritage Management Plan for the development to the satisfaction of the Planning Secretary.	Relevant – no change
Schedule 3, Condition 20	The applicant must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of the development to match its available water supply.	Relevant – no change
Schedule 3, Condition 21	The applicant must ensure that the development does not cause any water pollution, as defined under Section 120 of the POEO Act.	Relevant – no change
Schedule 3, Condition 22	The applicant must: a. Minimise erosion and control sediment generation b. Ensure the battery storage and ancillary infrastructure and any other land disturbance associated with the construction, upgrading or decommissioning of the development have appropriate drainage and erosion and sediment controls designed, installed and maintained in accordance with Managing Stormwater: Soils and Construction (Landcom, 2004) manual, or its latest version c. Ensure the battery storage and ancillary infrastructure (including security fencing) are designed, constructed and maintained to reduce impacts on surface water, localised flooding and groundwater at the site d. Ensure all works are undertaken in accordance with Guidelines for Controlled Activities on Waterfront Land (NRAR 2018), unless DPE Water agrees otherwise.	Relevant – no change
Schedule 3, Condition 23	Prior to commencing construction, the applicant must prepare a Soil and Water Management Plan for the development in consultation with DPE Water.	Relevant – no change
Schedule 3, Condition 24	Prior to commencing construction, unless the Planning Secretary agrees otherwise, the applicant must prepare a Fire Safety Study for the development to the satisfaction of FRNSW and the Planning Secretary.	Relevant – no change
Schedule 3, Condition 25	The applicant must store and handle all chemicals, fuels and oils used on site in accordance with: a. The requirements of all relevant Australian Standards, and	Relevant – no change

Condition No.	Description	Comment
	b. The NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids.	
Schedule 3, Condition 26	The applicant must: a. Minimise the fire risks of the development b. Ensure that the development 1. Includes defensible space 2. Manages the defensible space 3. Complies with the relevant requirements in the RFSs PBP 2019 c. Assist the RFS and emergency services as much as practicable if there is a fire in the vicinity of the site, and d. Notify the relevant local emergency management committee following construction of the development and prior to commencing operations.	Relevant – no change
Schedule 3, Condition 27	Prior to commencing construction, the applicant must develop and implement a comprehensive Emergency plan and detailed emergency procedures for the development in consultation with FRNSW and the NSW RFS.	Relevant – no change
Schedule 3, Condition 28	The applicant must: a. Minimise the waste generated by the development b. Classify all waste generated on site in accordance with the EPA's Waste Classification Guidelines 2014 c. Store and handle all waste on site in accordance with its classification d. Not receive or dispose of any waste on site e. Remove all waste from the site as soon as practicable and ensure it is reused, recycled or sent to an appropriately licensed waste facility for disposal.	Relevant – no change
Schedule 3, Condition 29	Prior to carrying out any development, the applicant must develop and implement a Remedial Action Plan prepared in accordance with the relevant guidelines produced or approved under the CLM Act 1997.	Relevant – no change
Schedule 3, Condition 30	Within one month of the completion of the remediation works, the applicant must submit a copy of a validation report/ letter to the Planning Secretary, which has been prepared, or reviewed and approved, by a certified consultant.	Relevant – no change
Schedule 3, Condition 31	Prior to the commencement of construction, the applicant must prepare and unexpected finds procedure to ensure that potentially contaminated material is appropriately managed.	Relevant – no change
Schedule 3, Condition 32	Within 18 months of the cessation of operations, unless the Planning Secretary agrees otherwise, the application must rehabilitate the site to the satisfaction of the Planning Secretary.	Relevant – no change

Condition No.	Description	Comment
Schedule 4		
Schedule 4, Condition 1	Prior to commencing construction, the applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Planning Secretary.	Relevant – no change
Schedule 4, Condition 2	The applicant must: - Update strategies, plans or programs required under this consent to the satisfaction of the Planning Secretary prior to carrying out any upgrading or decommissioning activities on site - Review and, if necessary, revise the strategies, plans or programs required under this consent to the satisfaction of the Planning Secretary within 1 month of the: - Submission of an incident report under condition 7 of Schedule 4 - Submission of an audit report under condition 11 of Schedule 4 - Any modification to the conditions of this consent.	Relevant – no change
Schedule 4, Condition 3	With the approval of the Planning Secretary, the applicant may submit any strategy, plan or program required by this consent on a progressive basis. To ensure the strategies, plans or programs under the conditions of this consent are updated on a regular basis, the applicant may at any time submit revised strategies, plans or programs to the Planning Secretary for approval.	Relevant – no change
Schedule 4, Condition 4	Prior to commencing the construction, operations, upgrading or decommissioning of the development or the cessation of operations, the application must notify DPE in writing via the Major Projects portal.	Relevant – no change
Schedule 4, Condition 5	Prior to commencing construction, the applicant must submit detailed plans of the final layout of the development to the Department via the Major Projects portal, showing comparison to the approved layout and including details of the siting of the battery storage and ancillary infrastructure.	Relevant – no change
Schedule 4, Condition 6	Prior to commencing operations or following the upgrades of any battery storage infrastructure or ancillary infrastructure, the applicant must submit work as executed plans of the development.	Relevant – no change
Schedule 4, Condition 7	The Planning Secretary must be notified immediately after the applicant becomes aware of an incident.	Relevant – no change
Schedule 4, Condition 8	The Planning Secretary must be notified in writing via the Major Projects website within seven days after the applicant becomes aware of any non-compliance.	Relevant – no change

Condition No.	Description	Comment
Schedule 4, Condition 9	A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for non-compliance (if known).	Relevant – no change
Schedule 4, Condition 10	A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.	Relevant – no change
Schedule 4, Condition 11	Independent audits of the development must be conducted and carried out in accordance with the <i>Independent Audit Post Approval Requirements (2020)</i> .	Relevant – no change
Schedule 4, Condition 12	Proposed independent auditors must be agreed in writing by the Planning Secretary prior to the commencement of an independent audit.	Relevant – no change
Schedule 4, Condition 13	The Planning Secretary may require the initial and subsequent independent audits to be undertaken at different times to those specified in condition 11 of Schedule 4 upon giving at least 4 weeks' notice to the applicant of the date upon which the audit must be commenced.	Relevant – no change
Schedule 4, Condition 14	In accordance with the specific requirements in the <i>Independent Audit Post Approval Requirements (2020)</i> , the applicant must: a. Review and respond to each Independent Audit Report prepared under condition 11 of Schedule 4 of this consent, or condition 13 of Schedule 4 where notice is given by the Planning Secretary. b. Submit the response to the Planning Secretary c. Make each Independent Audit Report, and response to it, publicly available within 60 days of submission to the Planning Secretary, unless otherwise agreed by the Planning Secretary.	Relevant – no change
Schedule 4, Condition 15	Independent Audit Reports and the Applicant's response to audit findings must be submitted to the Planning Secretary within 2 months of undertaking the independent audit site inspection as outlined in the <i>Independent Audit Post Approval Requirements (2020)</i> unless otherwise agreed by the Planning Secretary.	Relevant – no change
Schedule 4, Condition 16	Notwithstanding the requirements of the <i>Independent Audit Post Approvals Requirements (2020)</i> , the Planning Secretary may approve a request for ongoing independent operational audits to be ceased, where it has been demonstrated to the Planning Secretary's satisfaction that independent operational audits have demonstrated operational compliance.	Relevant – no change

Condition No.	Description	Comment
Schedule 4, Condition 17	The applicant must: a. Make the following information publicly available on its website as relevant to the stage of the development: 1. The EIS 2. The final layout plans for the development 3. Current statutory approvals for the development 4. Approved strategies, plans or programs required under the conditions of this consent 5. The proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged 6. How complaints about the development can be made 7. A complaints register 8. Any independent environmental audit, and the applicant's response to the recommendations in any audit 9. Any other matter required by the Planning Secretary. b. Keep this information up to date.	Relevant – no change
Appendices		
Appendix 1	General layout of development	The general layout plan will be modified to be consistent with Figure 3-1 .
Appendix 2	Schedule of lands	Relevant – no change
Appendix 3	Heavy vehicle/ route restrictions	The plan is to be updated to reflect the change in project area as a result of the modification (i.e., consistent with Figure 3-1). Importantly, the heavy vehicle haulage route will remain unchanged.
Appendix 4	Incident notification and reporting requirements	Relevant – no change

9.0 Management and mitigation measures

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

- Management and mitigation measures (refer to **Section 9.1**)
- Construction Environmental Management Plans (CEMPs) and sub-plans (refer to **Section 9.2**)
- Operational Environmental Management Plan (OEMP) or system (refer to **Section 9.3**).

9.1 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 9-1**. 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**. Deletions that may be relevant have been struck through.

Table 9-1 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: • Establish an exclusion zone around the area of PCT 155 in moderate condition, to ensure it would not be impacted by the Project • 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 should occur within the riparian corridor if the above ground transmission connection option is chosen.	Construction

ID	Management and mitigation measure	Timing
	- 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</i> (Cth).	
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</i> (Cth).	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: - As a precaution, demarcation would be placed around the two lithic items identified by RAPs (Lithic item 1 539897E 6461017N GDA Zone 54, Lithic item 2 539833E 6460989N GDA Zone 54) prior to works in the area 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	Construction

ID	Management and mitigation measure	Timing
	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	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: - Measures to manage erosion and stormwater - Stockpile management procedures for segregating spoil and preventing cross-contamination of clean spoil (virgin excavated natural material or excavated natural material) with potentially contaminated soil - 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	Construction

ID	Management and mitigation measure	Timing
	- 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	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.	Construction
C4	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> .	Construction
Noise and vibration		
NV1	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: - 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 - 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.	Construction
NV2	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	Construction

ID	Management and mitigation measure	Timing
	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.	
Transport and access		
T1	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: - 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	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: - 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. - 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.	Construction
SW2	The Site drainage system would: 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.	Operation

ID	Management and mitigation measure	Timing
	- 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. The design for stormwater management system at the Site would be discussed with Broken Hill City Council prior to being finalised.	
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	The following measures would be included in the SWMP if the option to install the transmission line belowground is chosen: 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 hours trenches would be backfilled and surface soils stabilised. 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.	Construction

ID	Management and mitigation measure	Timing
	• 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 ensure - ensure trench backfilling restores the channel shape and bed level so as 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 and assets of the Project (i.e. battery units, inverters and transformers).	Operation
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

ID	Management and mitigation measure	Timing
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	The Project Area would be maintained to achieve the performance requirement of an Inner Protection Area (IPA) as described by Appendix 4 of Planning for Bushfire Protection 2019. The following landscaping recommendations would be adopted to achieve the IPA for the Project: • 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 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	Construction

ID	Management and mitigation measure	Timing
	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: • Details of the Project • Construction period and construction hours • Complaint and incident reporting and how to obtain further information	Construction
SE2	Complaints received from the community would be recorded, monitored and acted upon	Construction

ID	Management and mitigation measure	Timing
SE3	Local services and materials would be prioritised for the Project as far as practical	Construction
Waste		
W1	A Waste Management Sub-Plan would be prepared as part of the CEMP. The Sub-Plan would: - 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
Air quality		
AQ1	The CEMP would include air quality management measures including: Daily construction activities would be planned to take into account the expected weather conditions for each workday. Regular dust observations to be	Construction

ID	Management and mitigation measure	Timing
	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.	

9.2 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.

9.3 Operation Environmental Management

Environmental performance during operation of the modification would be managed by the implementation of an OEMP. The OEMP would detail how the management and mitigation measures identified in **Section 9.1** 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 **Section 9.1**
- 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.

10.0 Evaluation and justification

This chapter outlines the justification for the Project (as modified) given the likely impacts and the merits of the proposed modification as a whole, along with the relevant legislative requirements. Specifically, this section of the Modification Report considers the principles of ecological sustainable development (refer to **Section 10.1**), as well as the objects of the EP&A Act (refer to **Section 10.2**).

10.1 Ecologically sustainable development

10.1.1 The principles

This section provides a review of the Project (as modified), its impacts and associated safeguards against the principles of ecologically sustainable development (ESD) in accordance with the EP&A Regulation. The principles, as listed in clause 7(4) of Schedule 2 of the EP&A Regulation, are as follows:

- a. *the **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by—*
 - (i) *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
 - (ii) *an assessment of the risk-weighted consequences of various options*
- b. ***inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations*
- c. ***conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration*
- d. ***improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services such as—*
 - (i) *polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
 - (ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
 - (iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The following sections provide an overview of the principles and how they have been applied to the Project (as modified).

10.1.2 Precautionary principle

The precautionary principle deals with certainty in environmental and technical decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

An amendment to a SSD project is a public process which examines the potential effects of the Project (as modified). Therefore, the modification process is considered precautionary in nature. The requirement to assess the impacts of the Project (as modified) is a form of regulation designed to identify and address uncertainty about the effects of the activities proposed as part of the modification.

10.1.3 Inter-generational equity

Inter-generational equity requires that the present generation pass onto the next generation an environment that does not limit the ability of those future generations to attain a quality of life at least equal to that of the current generation.

The Project (as modified) would support the transition to renewables by demonstrating the ability of a grid-scale battery to resolve system strength issues caused by intermittent renewable supply and the flow on impacts for renewable generation (e.g. curtailment risk and spilt energy). By demonstrating this, the Project (as modified) could support greater renewable integration, may reduce reliance on conventional fossil fuel sources and in turn, reduce the emissions of greenhouse gases. The reduction of greenhouse gases would help reduce the impacts of climate change, contributing to an improved quality of life for future generations.

The Project (as modified) would also provide storage, regulation and firming capacity to the NEM and enhance the stability of the grid, particularly around Broken Hill and along the 220 kV transmission line that connects it to the wider grid. By providing these grid services, the Project (as modified) would help additional renewable energy projects to utilise this part of the grid, further diversifying electricity generation in NSW. These benefits would help reduce greenhouse gases but would also mean that future generations can connect to this part of the grid.

This Modification Report has assessed the type and extent of potential impacts caused by the modification. The Project (as modified) incorporates a range of management and mitigation measures to minimise potential impacts on the environment (refer to **Chapter 9.0**). These measures aim to maintain the environmental conditions within and surrounding the Project (as modified) such that detrimental impacts do not affect the future health, diversity and productivity of the environment.

10.1.4 Conservation of biological diversity and ecological integrity

Biological diversity relates to the breadth and variety of life. Ecological integrity refers to maintenance of the relationships, dependencies and services supplied by all lifeforms and the physiochemical environment to each other. The conservation of these elements is critical to the proper functioning of natural environments and the biosphere in general. This principle asks that conservation of biological diversity and ecological integrity should be a fundamental consideration for a project.

A biodiversity development assessment report has been undertaken by qualified specialists to assess the ecological values within the modification area, to determine whether the proposed modification is likely to have an impact on threatened biodiversity (refer to **Appendix B**). Through the proposed management and mitigation measures it is concluded that the Project (as modified) would not have a significant adverse impact on the biological diversity or ongoing ecological integrity of the locality. The Project (as modified) is clearing only low to moderate condition vegetation, and avoidance of clearing impacts will continue to be a key focus during detailed design. The Project (as modified) would also include obtaining biodiversity credits to offset potential impacts where required.

10.1.5 Improved valuation and pricing of environmental resources

This ESD principle is premised on an assumption that all resources should be appropriately valued and that the value of environmental resources should be considered alongside any economic or cost benefit analysis for the life of the Project.

The Project (as modified) would provide value to the local and State economy while not compromising the natural value of the local environment and the services it provides. With the implementation of management and mitigation measures, the Project (as modified) would result in no significant impact to the environment, while supporting the reliability of energy supply at Broken Hill and storage and firming capacity to the NEM.

The Project (as modified) incorporates a range of management and mitigation measures to minimise potential impacts on the environment. The costs associated with these measures have been incorporated into the capital investment and operating costs of the Project.

10.1.6 Compatibility with the Principles of ESD

In preparing the modification, emphasis has been placed on the avoidance of impacts through careful design as well as management and mitigation measures to minimise potential negative environmental,

social and economic impacts. This has included the consideration of the principles of ESD. The Project is considered to be compatible with the principles of ESD.

10.2 Objects of the Environmental Planning and Assessment Act 1979

Consideration has been given to the consistency of the modification with the objects of the EP&A Act as outlined below.

a. *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources*

The modification would provide employment benefits and would not result in significant adverse ecological impacts. As the electricity market moves away from coal, emerging technologies such as battery storage are increasingly needed to facilitate the transition to renewable energy generation by allowing electricity to be dispatched to the grid as needed. The modification would allow for the approved Project (SSD-11437498) to provide storage and firming capacity to the NEM as well as additional services to assist grid stability, including frequency control ancillary services.

b. *to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment*

This Modification Report assesses the modification and identifies the likely impacts on the environment and surrounding community (refer to **Chapter 7.0 Environmental assessment**). With the implementation of management and mitigation measures outlined in **Chapter 9.0 Management and mitigation measures**, residual impacts on the environment are anticipated to be negligible.

c. *to promote the orderly and economic use and development of land*

The Broken Hill LEP provides for the land use and zoning for the modification area and surrounding area. The modification area is located wholly within land zoned IN1 General Industrial under the Broken Hill LEP. The modification works would support the existing and permissible land uses and therefore is in line with orderly and economic use and development of land. Furthermore, the modification would support the delivery of 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 (NSW Government, 2019).

d. *to promote the delivery and maintenance of affordable housing*

The modification would not affect the provision or maintenance of affordable housing.

e. *to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats*

The mitigation measures outlined within this Modification Report, would allow for the protection of the environment, including the protection and conservation of native animals and plants, threatened species, populations and ecological communities, and their habitats (refer to **Chapter 9.0 Management and mitigation measures**).

f. *to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)*

The modification is not anticipated to have an impact upon items of built or cultural heritage (including Aboriginal cultural heritage) following the implementation of the management and mitigation measures. The modification works support the sustainable management of built and cultural heritage.

g. *to promote good design and amenity of the built environment*

The modification would not result in a change in use of the project area, which would continue to operate as an industrial use.

h. *to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants*

The modification would not involve the construction or maintenance of any buildings. The proposed modification would operate in a safe and efficient manner.

i. to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State

The modification is to be assessed as under Part 4 of the EP&A Act by the NSW Minister for Planning and Public Spaces; specially against the relevant matters of consideration contained under section 4.55(2) of the EP&A Act.

j. to provide increased opportunity for community participation in environmental planning and assessment.

The modification was initiated in light of Transgrid's request to relocate the transmission connection. The community and other stakeholders, namely adjacent neighbours, the nearest residential neighbour and Broken Hill LALC, would continue to be engaged throughout the modification process. Community engagement would also be maintained throughout the construction of the modification (refer to **Chapter 6.0 Consultation**).

10.3 Project Justification

The modification to development consent SSD-11437498 is considered to be of minor environmental impact, given the extent of changes proposed to the approved development. The development as modified is substantially the same as the original approval (refer to **Section 1.3.1**). This Modification 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.

On the basis of the discussion within this Modification Report, the modification is considered to be justified.

11.0 References

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Appendix A

Consolidated Project Description

Appendix A Consolidated Project Description

Project overview

The Project comprises a BESS with a capacity of approximately 50 MW and up to 100 MWh that would store energy from the grid. Key features of the Project are summarised in **Table A-1**.

Table A-1 Consolidated project description

Project	Broken Hill Battery Energy Storage System (BESS)
Key features	- 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	The Project would be generally comprised of the following components: - 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	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.
Access	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.
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	Construction works would involve: - Enabling works - Civil, Structural, mechanical and electrical works - Commissioning - Demobilisation - A construction laydown area would also be provided on the Site.
Plant and equipment	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: - Enabling works - Front end loaders - Dump trucks

Project	Broken Hill Battery Energy Storage System (BESS)
	- Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles • Civil, structural, mechanical and electrical works: - 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: - Elevated work platforms - Cranes - Generators - Light vehicles. • Demobilisation: - Heavy vehicles including road trucks - Water trucks - Backhoe - Compactors - Light vehicles. • Maintenance equipment: - Chainsaws - Tractors - Light vehicles - Woodchippers/ mulchers.
Construction duration	Construction of the Project is intended to commence late 2021 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	The construction activities would be primarily carried out during standard construction hours, as defined by the <i>Interim Construction Noise Guideline</i>, being: • 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.

Project	Broken Hill Battery Energy Storage System (BESS)
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.

Battery storage technology and plant

While the BESS technology provider is yet to be determined, the BESS would consist of up to 180 containerised or stacked lithium-ion type batteries with integrated control systems, inverters, heating, ventilation and air conditioning units, transformers, and control rooms.

The integrated battery units would be up to 3 metres in height and have a footprint of approximately 2.6 metres by 12 metres each. Each battery unit would be arranged in groups that consist of lithium ion battery cells, inverters, medium voltage (MV) transformers, associated control systems, heating, air or liquid cooled, ventilation and air condition (HVAC) units. Each battery modular unit is to be mounted on concrete footings or potentially compacted gravel.

The BESS is intended to have an operational life of up to 20 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe. Following the end of economic life, above ground components would be removed and re-purposed where possible and land rehabilitated consistent with the surrounding area and in accordance with legislative requirements to achieve existing conditions as far as is reasonably practicable, if and as required.

A single-storey office building, control room and workshop area would also be included as part of the Project. The office building would be designed to have a maximum building height of 3 metres, whereas the control room would be constructed to a maximum height of 4 metres.

The batteries would be connected to a Battery Management System which provides a range of safety measures including:

- Preventing overcharging and current surges
- Maintaining voltage levels and ensuring the automatic cut-out in the event of electrical shorts
- Overheating or other unplanned events.

A heating, ventilating, and air conditioning system would maintain the batteries in the enclosure within safe operational temperature limits.

Access, circulation and parking

The Site is located on the western side of Pinnacles Place, which is a bi-directional 13 metres wide local road providing access for an industrial precinct and connection to Pinnacles Road. The two allotments comprising the Site have approximately 100 metre frontage to Pinnacles Place. Access to the Project would be established via a new crossing that accommodates entry and exit to the Site for light and heavy vehicles.

An internal road would be provided to enable vehicular access around the Site. Approximately three car parking spaces would be provided for operation. The amount of parking supplied for the Project is consistent with the low operational staffing needs of the Project.

An emergency secondary access road onto the unclassified road to the west of the Site would be utilised during emergencies.

Transmission connection

Either an above-ground or belowground (in part or in full) 22 kV transmission connection from the Site to the TransGrid Broken Hill substation would be constructed. It is expected that this line would be approximately 300 metres in length. The proposed transmission connection would require the construction of associated infrastructure, including a transmission connection landing gantry at the Site and connections at the substation.

A number of supporting structures would be required for the above ground option to carry the 22 kV transmission connection between the substation and the BESS. The supporting structures would be located on the Site, within the Transgrid Broken Hill substation land and on the land between these two areas (Lot 7302 DP 1181129). The belowground transmission connection would involve excavating a trench of around 1180 mm deep and 720 mm wide and stockpiling excavated material.

The transmission connection would require a corridor (approximately 20 metres wide) across Lot 7302 DP 1181129 (a semi-vegetated open space which includes an unsealed road) and part of the land within which the substation is located. This transmission connection would be constructed within the modification area shown on **Figure 4-1**, with the transmission connection alignment being indicative only.

External security

A high security fence would be constructed around the perimeter of the Site. Access to the Site would be controlled by security gates to facilitate authorised access only.

Infrastructure services

Table A-2 summarises the existing service infrastructure in proximity to the Site, and the expected amendments required to service the Project.

Table A-2 Infrastructure services

Infrastructure	Amendment/connection requirement
Stormwater	A concept level stormwater design has been developed, including drainage arrangements directing water to the most downstream boundary in the south-west of the Site.
Potable water	The Project would be connected to the existing potable water reticulated services on the Site. This would service the site office, as well as the battery cooling system.
Sewer	The existing sewer main traverses the western boundary of the Site. The Project would be connected to this sewer main.
Electricity	The Project components at the Site not connected to the BESS (e.g. site office and lighting) would be connected to the existing low voltage electrical aboveground network that services other businesses at Pinnacles Place.
Fire services	If required, a hydrant is located on the Site boundary adjacent to Pinnacles Place.

Project construction

The construction methodology would be further refined during the detailed design phases.

Construction methodology

The construction of the Project would be likely to include and not be limited to the following:

- Enabling works

- 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
- Development of site access to the sealed and unsealed road network adjacent to the Site (including Pinnacles Place)
- Transportation of plant, equipment, materials and workforce to and from the site as required
- Civil, structural, mechanical and electrical works
 - Detailed excavation for site services, including stormwater drainage, water and electrical reticulation
 - Construction of foundations for BESS facilities
 - Structural works for BESS facilities
 - Construction of supporting structures and connection of site services, e.g. office building and associated amenities, workshop.
 - Delivery, installation and electrical fit-out of BESS
 - Construction of transmission connection between the Site and the Transgrid Broken Hill substation, including the landing gantry on Site and the 22 kV busbar at the Transgrid Broken Hill substation.
- Commissioning
 - Testing and commissioning activities
- Installation of landscaping Demobilisation
 - Rehabilitation of disturbed areas and landscaping, as necessary
 - Removal of temporary construction facilities and construction equipment.

Enabling works

Enabling works for the Project would be carried out to prepare the Site for construction and would be likely to include:

- Site preparation: establishing site access, establishing erosion and sediment controls, establishing marked no go areas, site clearing, installing security fencing, establishing laydown areas, establishing construction amenities (including temporary offices, lunchrooms, storage areas and washrooms)
- Provision of temporary construction services, including site generators until power can be sourced from the existing distribution network
- Minor earthworks: form a level BESS pad on Site to ensure a suitable development footprint and establishment of site access. Any excavations within the Site would be to a maximum of 1.5 metres deep, with an up to 3 metre footing for the transmission line poles (for the above ground transmission connection option).
- Delivery of BESS facility components.

Civil, structural, mechanical and electrical works

Following the enabling works, the following works would be likely to be completed:

- Site drainage and underground services would be installed
- Concrete foundations and slabs for the battery enclosures, site facilities and ancillary components would be formed

- Construction, installation and connection of aboveground civil, mechanical and electrical plant equipment and structures, including battery enclosures, connection infrastructure, formal access and circulation, as well as ancillary site facilities and site security
- Construction of transmission connection between the Site and Transgrid Broken Hill substation either above ground or belowground (in part or in full):

Belowground option

- Excavating a trench of around 1180 mm deep and 720 mm wide and stockpiling excavated material
- Laying the cables in a trefoil configuration
- Backfilling the trench (including laying marker layers etc.)
- Rehabilitating the surface.

At three locations along the transmission connection corridor more specific construction approaches would be used. These include the:

- Trough crossing - The transmission connection would have an interaction with planned 22 kV cable connections within the Transgrid Broken Hill substation. At this location it is planned to locate the proposed cable trench for the BESS connection underneath the future trough for the Transgrid 22 kV cables. To facilitate this and to manage thermal loads a concrete sleeve would be installed at the base of the trench for the BESS transmission lines to pass through. This sleeve would be located beneath Transgrid's cable trough.
- Road crossing – An unnamed, unsealed road is located between the Site and the ephemeral drainage line. Where the proposed connection lines cross this road, the trench would be up to 1300 mm deep and 1000 mm wide and the cable would be installed in a conduit to provide protection.
- Ephemeral drainage line crossing – The connection lines would be protected where they cross the ephemeral drainage line from tunnel erosion using conduits and/or underground concrete protection.

Aboveground option

- Construction of transmission connection between the Site and Transgrid Broken Hill substation would include installation of supporting structures, stringing the transmission line, and works at the transmission connection landing gantry within the Site and the 22 kV busbar at the substation. The disturbance footprint of this installation would be likely be limited to construction of one support structure within the Site, and the construction of a support structure/s within the Commons, and the substation site. The cable would then span into the busbar for connection.
- Internal fit out of site office and control room, which may progress in several stages over an extended period.

Commissioning

This phase would include testing and commissioning activities. Commissioning would include the operation of all elements of the Project, ensuring the Project is operating in accordance with the performance requirements.

Demobilisation

At the completion of construction, the disturbed areas on Site would be rehabilitated and landscaped, if deemed necessary. Temporary construction facilities would be removed together with remaining construction equipment.

Materials, stockpiling and laydown areas

Materials, stockpiling and laydown areas would be designated during the detailed design and pre-construction phase along with:

- Spoil handling and storage

- Dangerous goods storage
- Workshop and equipment storage
- Onsite parking
- Construction compounds with site offices and staff amenities
- Site access and egress.

The construction laydown areas would be contained on the Site, where possible. The location of these areas would be outlined within the CEMP. The CEMP would be prepared by the contractor prior to the commencement of construction.

Construction laydown areas, hardstand and car park would be compacted and sealed, as required. All areas would have adequate drainage and erosion and sediment controls installed.

Construction program

An indicative schedule for construction is provided in **Table A-3**.

Table A-3 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

Construction plant and equipment

Table A-4 provides the likely list of plant and equipment that would be used to construct the Project. The equipment list would be further refined during detailed design.

Table A-4 Likely plant and equipment required for construction

Equipment to be used during construction	
Enabling works	
Front end loaders	Excavators
Dump trucks	Graders
Heavy vehicles including road trucks	Compactors
Water Trucks	Light vehicles
Civil, structural, mechanical and electrical works	
Front end loaders	Dump trucks
Heavy vehicles including road trucks	Excavators
Graders	Scrapers
Concrete trucks and pumps	Compactors and rollers
Elevated work platforms	Scrapers
Cranes	Backhoe
Concrete saws and grinders	Generators
Water carts	Light vehicles
Commissioning	
Elevated work platforms	Generators
Cranes	Light vehicles

Equipment to be used during construction	
Demobilisation	
Heavy vehicles including road trucks	Backhoe
Water Trucks	Compactors
Light vehicles	

Construction traffic

Initial access to the Site would be via existing access points along Pinnacles Place, with contingent temporary access/ egress provided from Lot 7203 DP 1181129. Construction activities relating to the connection of the BESS with the existing Transgrid Broken Hill substation would also require temporary access to Lot 7203 DP 1181129. Access to the Transgrid Broken Hill substation would likely be provided via the existing accessway off Pinnacles Road.

Construction traffic would be generated during all four construction stages and would include the delivery of plant, equipment and materials. At the peak of the construction phase, it is estimated that the works would generate up to 50 light vehicles and 20 heavy vehicles per day. Construction traffic is likely to follow the most direct routes to the Site, so as to avoid smaller local roads, where practicable. Construction worker parking for some construction workers would be onsite, the remainder would be required to park in surrounding streets. A CTMP would be prepared as part of the CEMP and would be implemented prior to the commencement of construction.

Construction workforce and hours

It is anticipated that up to 50 construction workers (at peak) would be required. These workers would be preferentially sourced locally where appropriate skill sets are economically available.

The Project would be constructed during standard construction hours, where practicable. The standard hours of construction are as follows:

- Monday to Friday between 7:00am and 6:00pm
- Saturday from 8:00am to 1:00pm
- No work on Sundays or public holidays.

No out of hours works are anticipated for the Project.

Operation activities

Operational activities

The operation of the Project would involve but not be limited to the following:

- Maintenance and management of equipment
- General office activities
- Receipt of goods
- Waste removal.

Operational workforce and hours

The Project would operate 24 hours a day, 7 days a week. The Project is expected to undergo approximately one charge and discharge cycle per day, averaging 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.

The Project would be an unmanned facility that is managed remotely. It is anticipated that the one to three employees would be required periodically for maintenance activities.

Operational plant and equipment

Table A-5 provides an indicative list of plant and equipment that would be used to maintain the Site.

Table A-5 Indicative plant and equipment for operation

Equipment to be used during operation	
Maintenance activities	
Chainsaws	Light vehicles
Tractors	Woodchippers and mulchers

Project decommissioning

The BESS is intended to have an operational life of up to 20 years and, depending on the selected technology components, may be replaced and/or upgraded to extend this timeframe. Following the end of economic life, above ground components would be removed and re-purposed where possible and land rehabilitated to achieve near to pre-development conditions as reasonably practicable (such as removing buildings and infrastructure and rehabilitating the site using native species).

All decommissioning and restoration activities would be in accordance with applicable Federal, State, and Local legislative permits, approvals and regulatory requirements at the time.

Demolition and remediation works are subject to certain environmental approvals and safeguards.

Appendix B

Biodiversity Development Assessment Report

Broken Hill Battery Energy Storage System Project Modification 1

Biodiversity Development Assessment Report

Prepared for AGL Energy Limited | 24 January 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)



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Executive summary

Context

AGL Energy Limited (AGL) 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 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 AGL 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, undertaken in accordance with the BAM, 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 0.6 ha of low condition native vegetation (largest possible clearing extent)
- Removal of 0.6 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 seven ecosystem credits (PCT 155) and seven 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
SAII	Serious and Irreversible Impacts
TEC	Threatened Ecological Community
VI	Vegetation Integrity as calculated by the BAM-C

Table of Contents

Executive summary	i
Glossary and list of abbreviations	iii
1. Introduction	1
1.1 Context	1
1.2 The Approved Project	1
1.3 Modification	3
1.4 The Modification Area	3
1.5 Approval and assessment process	4
1.6 Assessment objectives and format	5
1.7 Assessment resources and assessor qualifications	5
2. Landscape Assessment	7
2.1 Landscape assessment - methods	7
3. Native vegetation and flora assessment	11
3.1 Methods - assessment of threatened species and populations	11
3.2 Fauna assessment	19
4. Impact Assessment	27
4.1 Avoid and minimise impacts	27
4.2 Impact summary	28
5. Quantifying Offset Requirements	31
5.1 Summary of ecosystem credits required	31
5.2 Summary of species credits required	33
5.3 Staging the credit offset liability	33
6. Summary	34
References	35
Annex 1. Plant community descriptions	37
Annex 2. Floristic plot data	38
Annex 3. BAM plot transect scores	42
Annex 4. Fauna species list	43
Annex 5. Threatened species status and likelihood of occurrence	44
Annex 6. EPBC Act Significant Impact Criteria Assessment	58
Annex 7. EPBC Act Referral decision notice	61
Annex 8. Ecosystem and species credits required (BAM-C Credit report) for the Modification	63
Annex 9. Ecosystem and species credits required (BAM-C Credit report) for the approved Project	83

List of Figures

Figure 1. Site map	9
Figure 2. Location map	10
Figure 3. Vegetation zones and plot locations.....	15
Figure 4. Species polygon	26
Figure 5. Impact summary	32

List of Tables

Table 1: Subject land address and lot details	1
Table 2: Assessor qualifications and resources	6
Table 3: Assessment resources and guidelines used	6
Table 4: Landscape features and scoring under the NSW BAM.....	7
Table 5: Likelihood of occurrence criteria	12
Table 6: Candidate and other threatened flora species with the potential to occur and requirement for survey.....	13
Table 7: Plant Community Types present across the Modification Area	16
Table 8: Survey effort (flora and vegetation)	17
Table 9: Vegetation zones with current and future vegetation integrity scores	18
Table 10: Candidate flora species and assessment of credit requirement	18
Table 11: Candidate (species credit) threatened fauna species with the potential to occur or requirement for survey	21
Table 12: Fauna survey effort.....	23
Table 13: Weather conditions during survey.....	23
Table 14: Candidate fauna species and assessment of credit requirement	25
Table 15: Mitigation measures	27
Table 16: Assessment of direct and indirect impacts as a result of the Modification	29
Table 17: Ecosystem credit requirement.....	31
Table 18: Species credits required.....	33
Table 19: Staged credit obligation	33
Table 20: Floristic plot cover (%) data	38

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 Energy Limited (AGL) 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 AGL 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). AGL is therefore seeking to modify SSD-11437498 to enable the new connection route to be potentially constructed underground 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 to assess the biodiversity constraints associated with three different siting options, and to allow AGL 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 encompasses around 2.5 hectares (ha) of land zoned IN1 (General Industrial) under the Broken Hill Local Environmental Plan, 2013 (LEP).

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 regrowth of native flora species within highly disturbed areas, and a lack of larger woody vegetation 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.

1.4.1 Disturbance footprint/direct impact area

Within the Modification 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 0.6 ha of the Modification Area 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.

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 1.3).

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 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 in March 2021 for the approved Project; however, no significant impacts on MNES are anticipated from the Modification. 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 Biosecurity Act 2015

The broad objectives for biosecurity in NSW under the *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 *Biosecurity Act 2015*, priority weeds are defined in 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 under the *Biosecurity Act 2015* have been identified 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 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	- 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	NSW - 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) Commonwealth - 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 4 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.

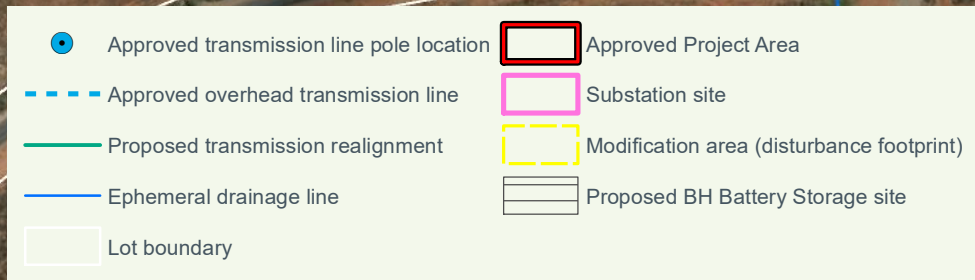
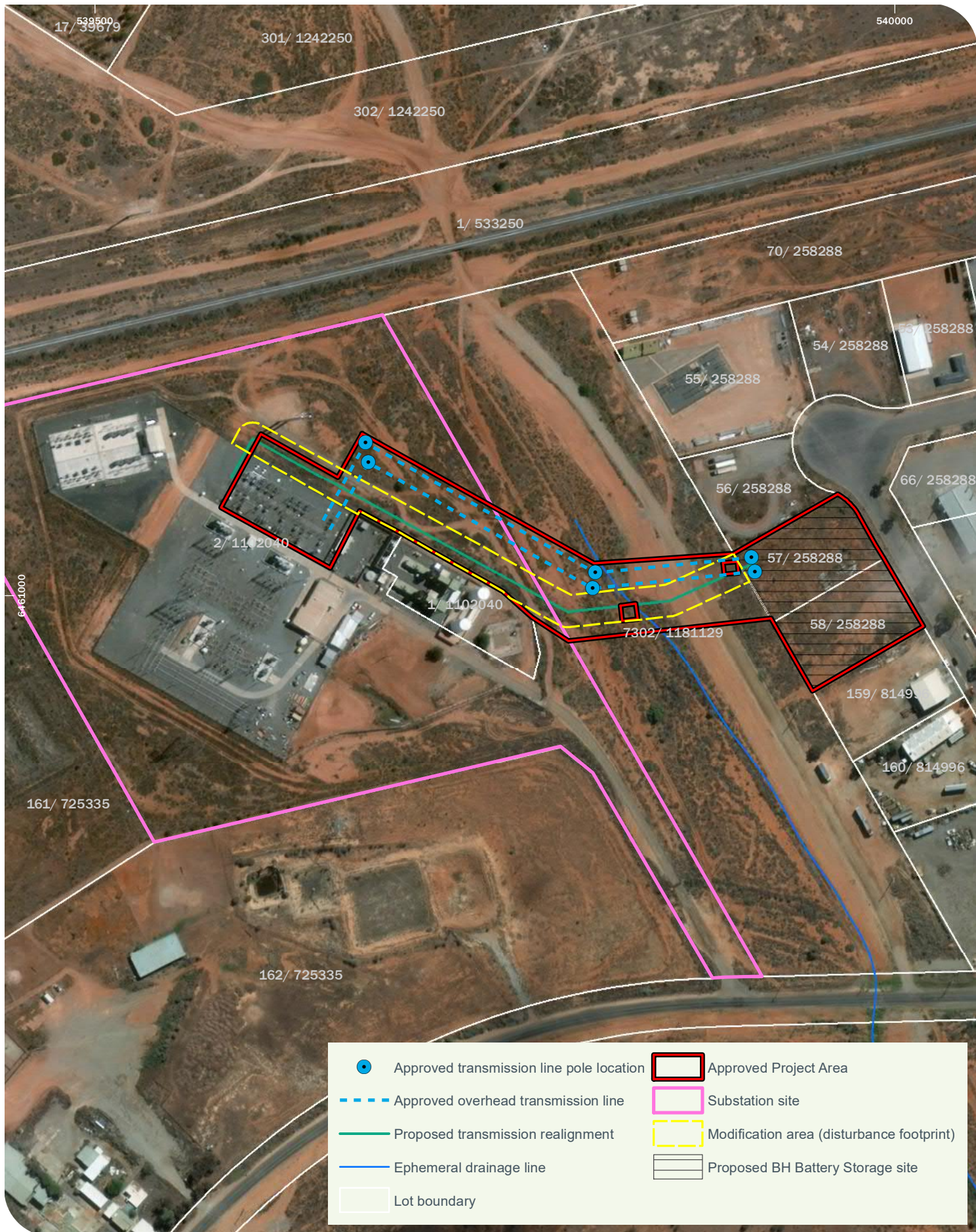
2.1.1 Landscape features and scoring

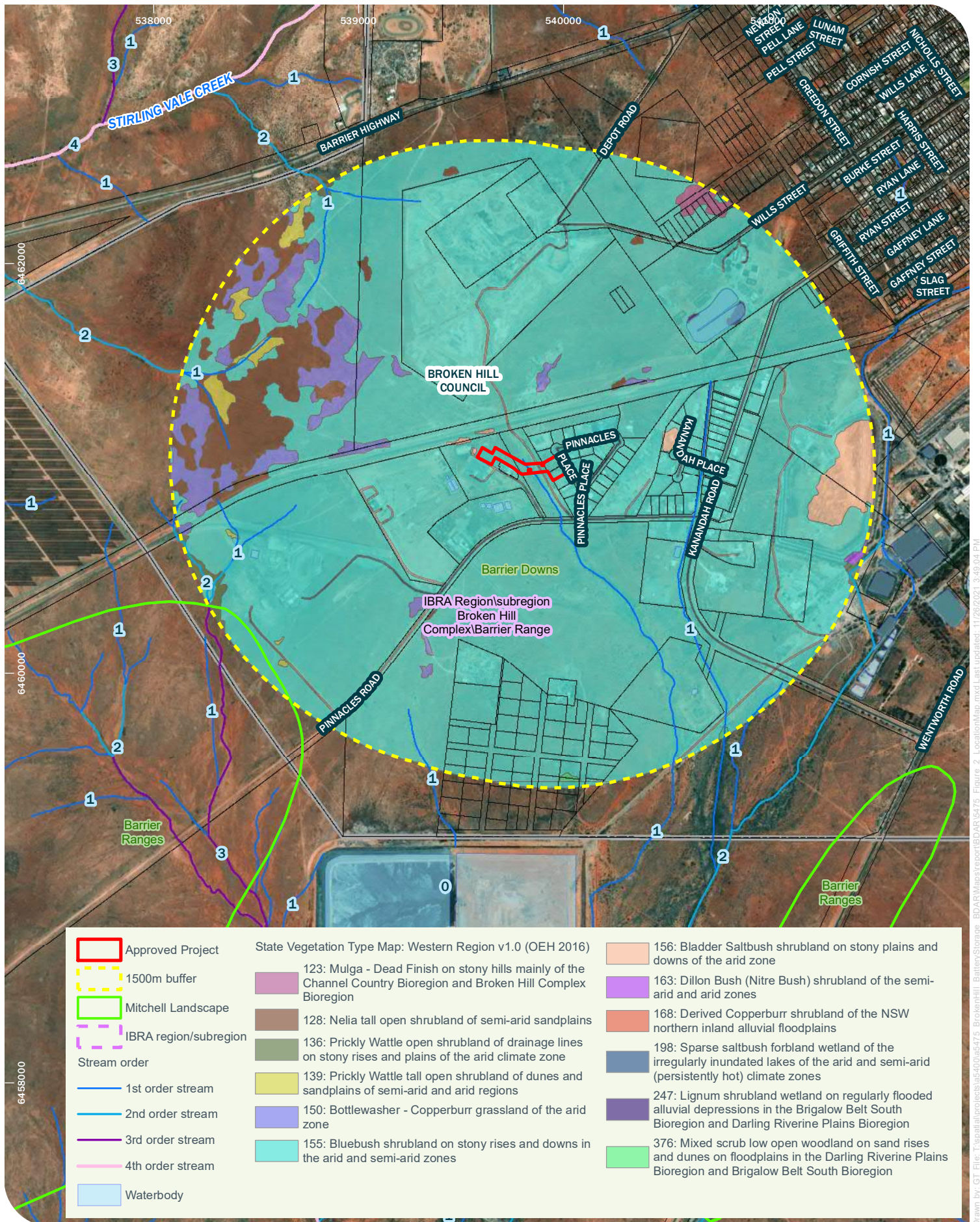
Table 4 provides details of the landscape settings and scored landscape features for the Modification.

Table 4: Landscape features and scoring under the NSW BAM

Landscape features	Description	Figure reference
Modification Area size	2.5 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	Limited connectivity due to the presence of roads on all sides, railway track to the north of the Modification Area, and industrial infrastructure in neighbouring properties. Large tracts of shrubland vegetation to the north and south of the Modification Area.	Figure 1 and Figure 2

Landscape features	Description	Figure reference
Buffer area (percent native vegetation cover)	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. <i>Native vegetation cover</i> 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. For woody vegetation 95 per cent of the buffer area was determined to support native woody vegetation with benchmark cover (999.51 ha). For non-woody vegetation (grassland) 4 per cent of the buffer area was determined to support native grassland with benchmark cover (42.55 ha). <i>Total native vegetation cover</i> 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.	Figure 2
Site context	Site-based assessment	-
Geological significance and soils	There are no karst, caves, crevices, cliffs or other areas of geological significance within the Modification Area. There are no high hazard soil areas.	-





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 2021) 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) (Commonwealth Department of Agriculture, Water and the Environment [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 2 of the BAM.

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 SAI?	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-Keeled 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. Survey outside specified months however known to flower in spring to early summer. Evidence of dieback should have been detectable during targeted searches.	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out. Not detected.
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

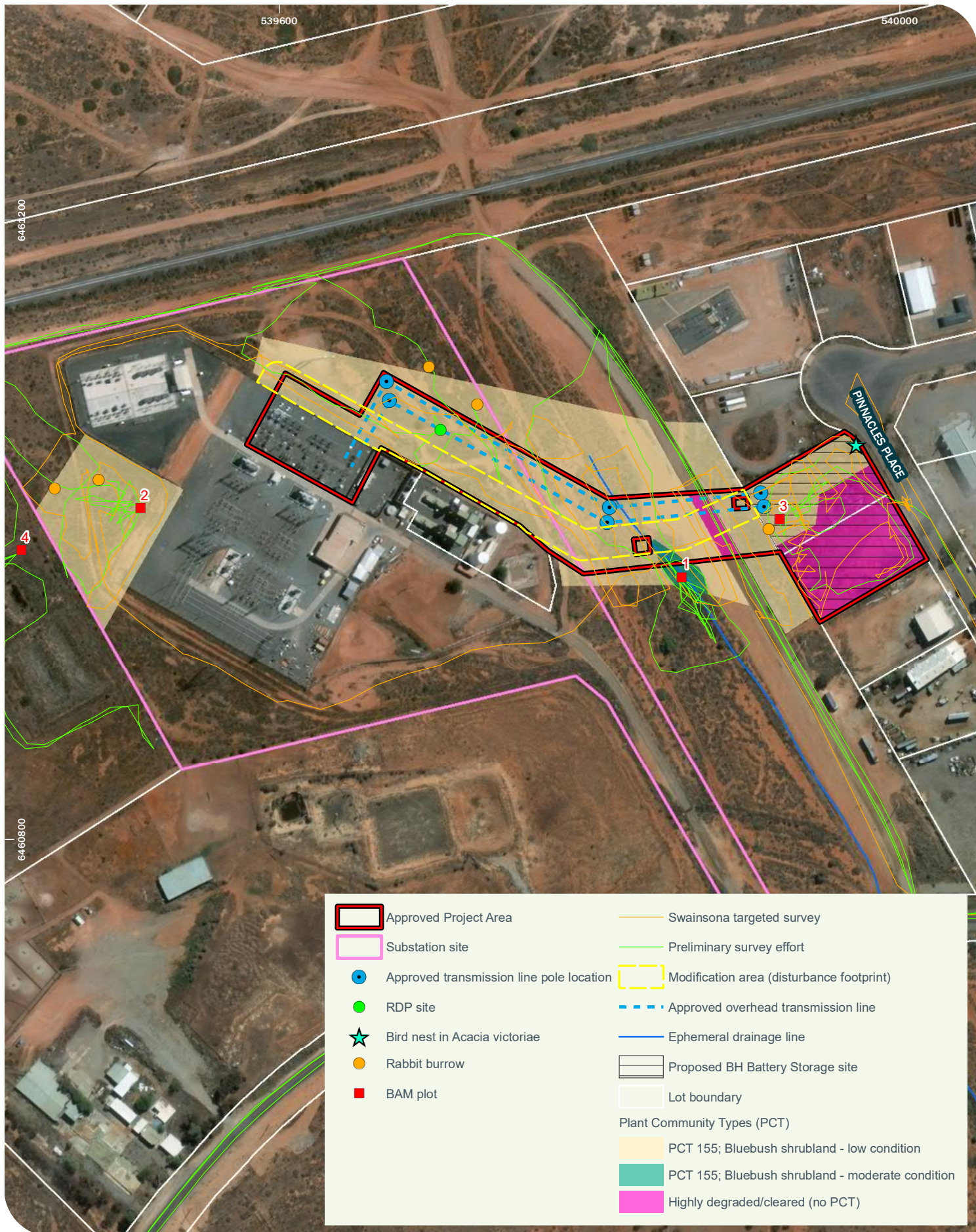
The BAM plot requirement was determined using the BAM (DPIE 2020a) and was based on the area of each PCT condition type to be impacted.

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. Details regarding PCT delineation and mapping are provided in Section 3.1.3. 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 [BESS footprint] and plot 3 [transmission easement]) 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.

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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Table 7: Plant Community Types present across the Modification Area

PCT ID	PCT name	Condition	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	Not listed	Arid Shrublands (Chenopod sub-formation)	Gibber Chenopod Shrublands	50	0.59	1	1
		Moderate					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 during relevant flowering periods for the following potentially occurring threatened flora: • Mallee Golden Wattle (<i>Acacia notabilis</i>) • Yellow-keeled Swainsona (<i>Swainsona flavicarinata</i>) • Creeping Darling Pea (<i>Swainsona viridis</i>) • Slender Darling Pea (<i>Swainsona murrayana</i>)	10 & 11 December 2019 29 October 2020

More detailed vegetation community descriptions, including species used to aid in determining PCTs and justification for alignment to each of the nominated PCTs are provided in Annex 1.

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	0.59	101	21.9	0	-21.9
PCT 155_Moderate	1	0.01	101	66.5	0	-66.5

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 SAIL. 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 SAIL?	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 SAIL?	Habitat constraint (BAM)	Survey timing/effort	Status
Slender Darling Pea	<i>Swainsona murrayana</i>	V	V	No	None identified in BAM-C	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). 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.	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 6.4 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 6.4 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.

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.

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 SAI?	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		BAM-C	No The species is known from one population at Packsaddle approximately 175 km to the north of Broken Hill. It is very unlikely to be present within the study area. Opportunistic survey did not detect this species.	No
<i>Antaresia stimsoni</i>	Stimson's Python	V	n/a	No	Rocky areas within 500m of rocks or gibber	Sep-Mar			BAM-C	No Limiting habitat not present	No
<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		BAM-C	No Based on a combination of the following, the Modification Area was deemed too degraded and unsuitable for this species: - lack of nearby records (or any in the subregion) (closest record is greater than 100 km) - presence of European Rabbits	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
										previous clearing has caused a reduction in shrub and ground cover density which provides shelter habitat and also increases the risk of predation from cats and foxes.	
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.

3.2.2.1 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.

Species polygons

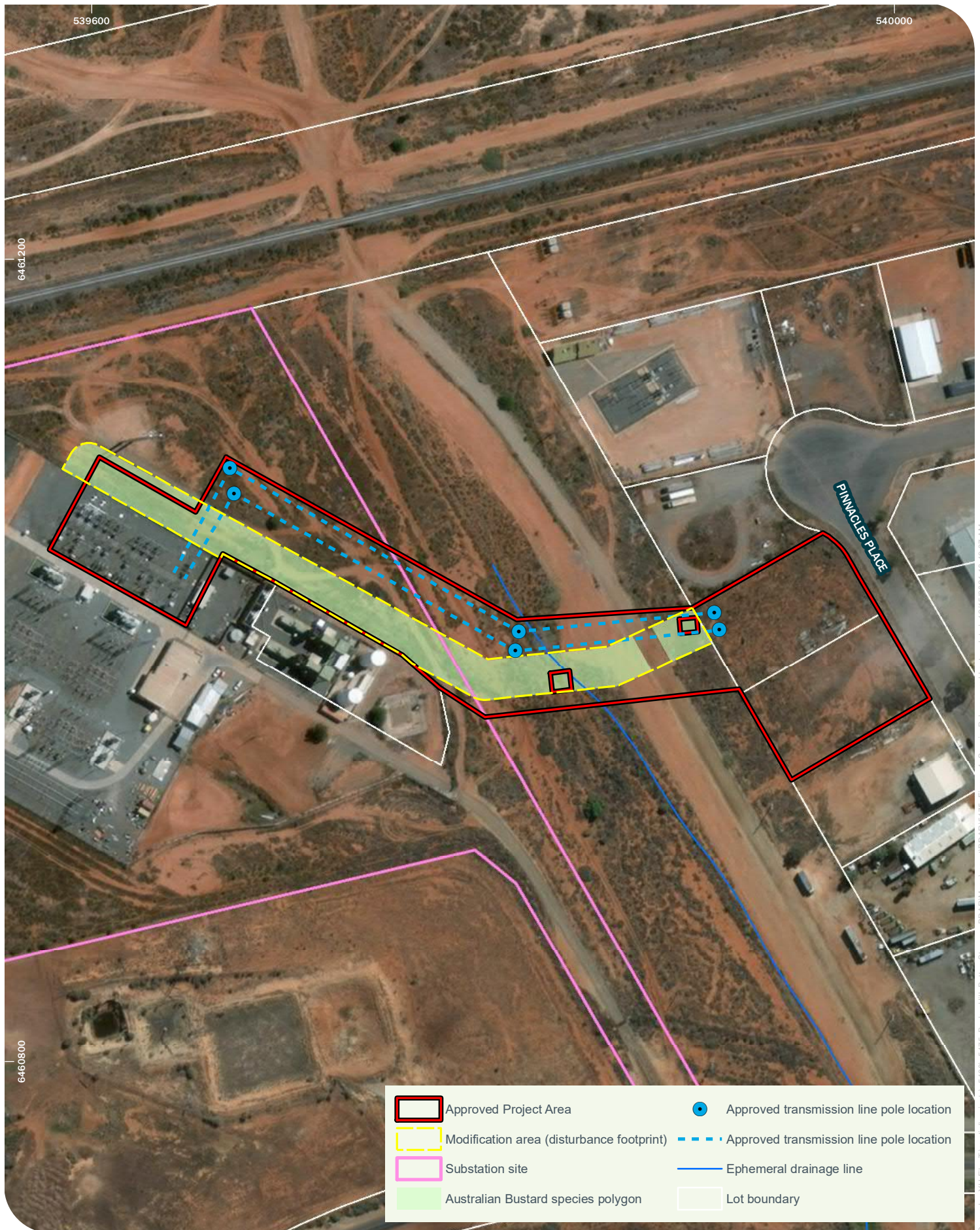
As required by step five of section 6.4 of the BAM, a species polygon was prepared which identifies the areas of the Modification Area that contain habitat suitable for each candidate species (Figure 4). The Australian Bustard is the only candidate species which has been assumed present. This species 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).

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.

Table 14: Candidate fauna species and assessment of credit requirement

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Yes – assumed present
Bolam's Mouse	<i>Pseudomys bolami</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>Chalinolobus 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
Marble-faced Delma	<i>Delma australis</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>Lophochroa 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



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4. Impact Assessment

The Impact Assessment forms Stage 2 of the BDAR as detailed in section 8 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 AGL 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 (2020) 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 a Construction Environmental Management Plan (CEMP).

The CEMP would include a Biodiversity Management Plan (BMP). 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).

Table 15: Mitigation measures

Mitigation measure and timing	Responsibility
Pre-construction	
<i>Preparation of a Biodiversity Management Plan</i> – to include measures listed below.	Project manager
<i>Delineation of the site</i> – establish exclusion zone around the Modification Area to ensure clearing does not occur outside those boundaries.	Project manager
<i>Staff training</i> – e.g. communicate the importance of exclusion zones, erosion and sediment controls, unexpected species finds procedure.	Project manager
Construction	
<i>Erosion and sediment controls</i> – Implementation of erosion and sediment controls for the duration of construction works (detailed in CEMP).	Project manager
<i>Hygiene protocols</i> - prevent the spread of weeds or pathogens between affected areas and unaffected areas.	Project manager

Mitigation measure and timing	Responsibility
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</i> .	Project manager/ Weed contractor
Excavation through ephemeral stream - open trenching to be undertaken during periods of no rainfall and water flow. Area to be backfilled and rehabilitated immediately post-construction (as is reasonably practical) with plants endemic to the locality.	Project manager
Operation	
All waste would be appropriately managed.	Project manager

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 16 below.

A likelihood rating of Known, High, Moderate, Low or None has been assigned to each of the potential impacts listed in Table 16.

Table 16: 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 0.31 ha of low condition native vegetation (PCT 155) would be removed from the Site. Another 0.59 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 (SAIL)

The BC Act imposes various obligations on decision-makers in relation to impacts on biodiversity values that are at risk of SAIL. 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).

While three threatened species at risk of SAIL were considered to have the potential to occur within the Modification Area, targeted surveys did not detect these species' presence. As such, no threatened biodiversity at risk of SAIL 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 17.

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

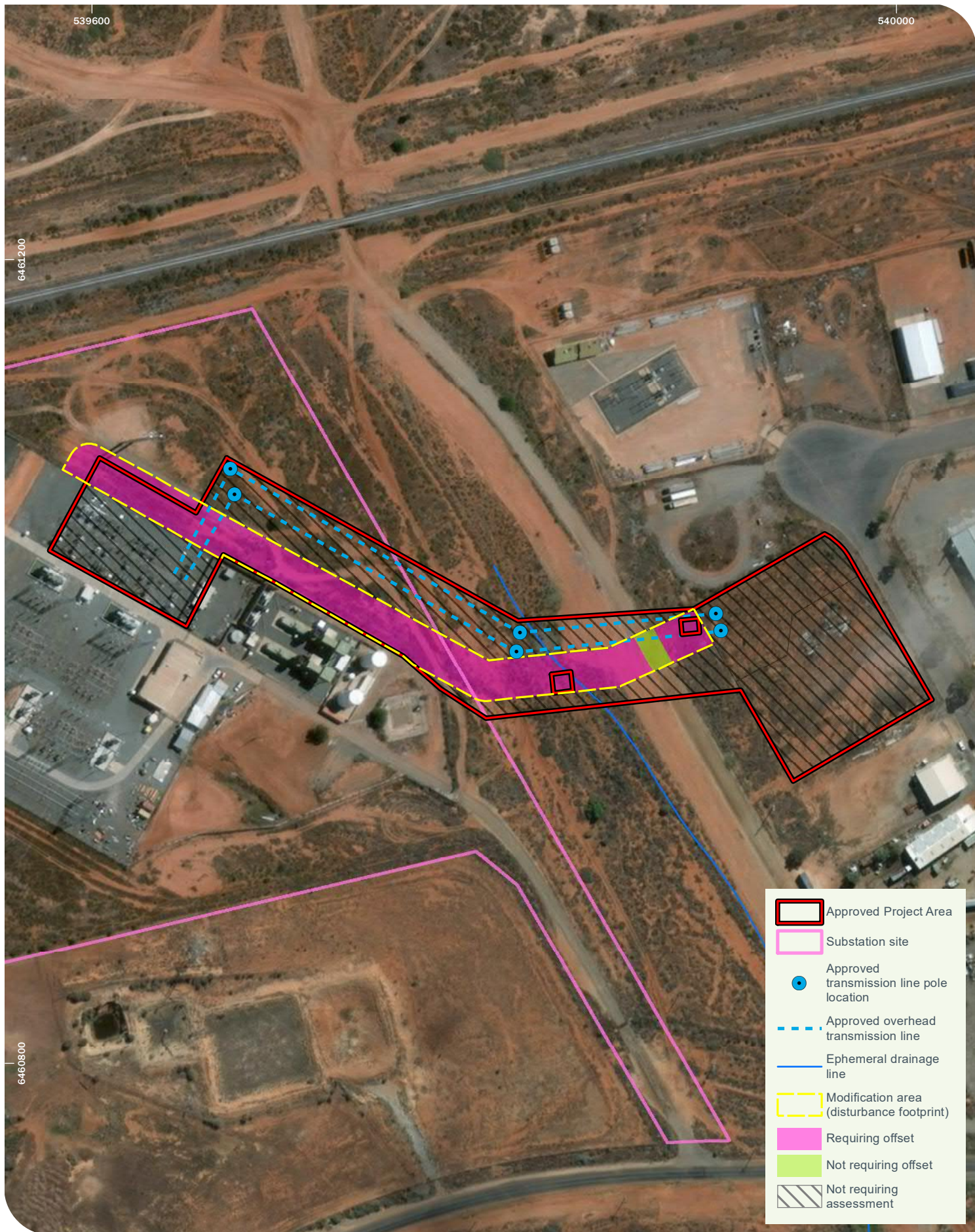
Table 17: Ecosystem credit requirement

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	0.59	21.9	0	-21.9	1.75	6
155 - Moderate	0.01	66.5	0	-66.5	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.



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5.2 Summary of species credits required

The results of the BAM-C species offset credit requirements are shown in Table 18. 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 seven species credits. The full BAM-C biodiversity credit report is provided in Annex 8.

Table 18: Species credits required

Threatened species	Habitat impacted (ha)	Required credits
Australian Bustard (<i>Ardeotis australis</i>)	0.6	7

5.3 Staging the credit offset liability

AGL is proposing to stage the credit offset liability for the approved Project and Modification as follows:

- Stage 1 (BESS site)
- Stage 2 (transmission line).

The ecosystem and species credits required to be offset for each stage have been calculated using two separate calculation versions within the BAM-C; revision 7 (Stage 1) (Annex 9) and revision 12 (Stage 2) (Annex 8). Table 19 provides the area of each stage and the ecosystem and credit requirements of each.

Table 19: Staged credit obligation

Stage	Area impacted (ha)	Required ecosystem credits	Required species credits
1	0.31	3	3
2	0.6	7	7
Total	0.91	10	10

6. Summary

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

- Direct removal of 0.6 ha of native vegetation containing one non-threatened PCT in low and moderate condition
- Removal of 0.6 ha of fauna habitat (native vegetation) including potential low-quality habitat for threatened fauna
- Removal of 0.6 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 seven ecosystem credits for PCT 155. These ecosystem credits also cover the credit requirement for ecosystem credit species.
- Species credits: a total of seven species credits for the Australian Bustard.

The proposed staging of the credit offset obligation for both the approved Project and Modification will require the following:

- Stage 1 (BESS site)
 - 3 ecosystem credits for PCT 155.
 - 3 species credits for the Australian Bustard.
- Stage 2 (transmission line).
 - 7 ecosystem credits for PCT 155.
 - 7 species credits for the Australian Bustard.

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Annex 1. Plant community descriptions

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

Extent:

This community was present throughout the approved Project Area, and 0.6 ha within the Modification Area.

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. 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 regrowth is only sparse, there are sufficient plant species present to consider it as an intact 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 Noonthorangee 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.

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 (%) data¹

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</i> spp.	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</i> spp.	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</i> spp.	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</i> spp.	Copperburr, Poverty-bush		0.1		
Chenopodiaceae	<i>Sclerolaena tricuspis</i>	Giant Redburr		1		

¹ BAM Plots 1 and 3 were used for BAM-C calculations and are also referred to as vegetation zone 1. 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</i> subsp. <i>zygophylla</i>				4	
Fabaceae (Caesalpinioideae)	<i>Senna artemisioides</i> subsp. <i>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</i> subsp. <i>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</i> spp.		0.1			
Myrtaceae	<i>Eucalyptus</i> spp.			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>Zygophyllum eremaeum</i>	Climbing Twinleaf			0.1	

* exotic species

Table 20: Digital field survey data for each plot

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)
5475pm02	2142	<i>Maireana</i>	<i>pyramidata</i>	30		Shrub (SG)
5475pm02	2161	<i>Rhagodia</i>	<i>spinescens</i>	10		Shrub (SG)

Waypoint ID	Species Number	Genus	Species	Cover	Abundance	Growth Form
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>billardierei</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>Sarcosoma</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	1	0	67.4	0.2	1.3	0	3.4	2
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	3	1	0	6.3	0	0	0	0.3	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

Those subregions where a species was recorded (NSW BioNet Atlas database record) or where the BAM-C considered a species as potentially occurring are presented in red text.

Data source: BAM-C = BAM Calculator output Impact Area (direct impacts); ATLAS = NSW BioNet Atlas; PMST = Commonwealth Protected Matters Search Tool.

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

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

Note: fish 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, sedgeland 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.	Low
<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, Nocolche 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 Babbler 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, bullocke <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 Sheath-tail-bat	V	-	The Yellow-bellied Sheath-tail-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, Wyallda 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; soils 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 0.6 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 0.6 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 0.6 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 0.6 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 0.6 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 0.6 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.



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
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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

Annex 8. Ecosystem and species credits required (BAM-C Credit report) for the Modification

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS18054	Finalised	24/01/2022
Assessment Revision	Assessment Type	BOS entry trigger
12	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* 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	0.59	PCT Cleared - 50%	High Sensitivity to Potential Gain			1.75		6

BAM Credit Summary Report

2	155_Mode rate	Not a TEC	66.5	66.5	0.01	PCT Cleared - 50%	High Sensitivity to Potential Gain			1.75		1
											Subtotal	7
											Total	7

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 SAIL	Species credits
<i>Ardeotis australis / Australian Bustard (Fauna)</i>									
155_Moderate	66.5	66.5	0.01			Endangered	Not Listed	False	1
155_Low	21.9	21.9	0.59			Endangered	Not Listed	False	6
								Subtotal	7

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
12	24/01/2022	BOS Threshold: Area clearing threshold

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

List of Species Requiring Survey

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

BAM Candidate Species Report

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

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	Ctenophorus mirrityana	Habitat constraints
Crowned Gecko	Lucasium stenodactylum	Habitat degraded Species is vagrant
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Major Mitchell's Cockatoo	Lophochroa leadbeateri	Habitat constraints
Showy Indigo	Indigofera longibractea	Habitat constraints
Stimson's Python	Antaresia stimsoni	Habitat constraints
Thick-billed Grasswren (north-west NSW subspecies)	Amytornis modestus obscurior	Habitat degraded

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
12	BOS Threshold: Area clearing threshold	24/01/2022

* 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	Hieraaetus morphnoides	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones

BAM Predicted Species Report

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

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
12	24/01/2022	BOS Threshold: Area clearing threshold

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
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BAM Vegetation Zones Report

1	155_Low	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	Low	0.59	1	
2	155_Moderate	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	Moderate	0.01	1	

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Stephen Bloomfield	BAAS18054	50
Proponent Names	Report Created	BAM Case Status
	24/01/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
12	Part 4 Developments (General)	24/01/2022
BOS entry trigger	* 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.	
BOS Threshold: Area clearing threshold		

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



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

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	0.6	0	7	7

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	6	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.
	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_Moderate, 155_Low	0.6	7.00

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

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Stephen Bloomfield	BAAS18054	50
Proponent Name(s)	Report Created	BAM Case Status
	24/01/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
12	Part 4 Developments (General)	24/01/2022
BOS entry trigger	* 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.	
BOS Threshold: Area clearing threshold		

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
None added

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Variations)

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	0.6	0	7	7.00
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
	Gibber Chenopod Shrublands This includes PCT's: 155, 156	Gibber Chenopod Shrublands >=50% and <70%	155_Low	No	6
					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.
	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.
Variation options					

BAM Biodiversity Credit Report (Variations)

Formation	Trading group	Zone	HBT	Credits	IBRA region
Arid Shrublands (Chenopod sub-formation)	Tier 3 or higher threat status	155_Low	No	6	IBRA Region: Broken Hill Complex, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Arid Shrublands (Chenopod sub-formation)	Tier 3 or higher threat status	155_Moderate	No	1	IBRA Region: Broken Hill Complex, 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_Moderate, 155_Low	0.6	7.00

BAM Biodiversity Credit Report (Variations)

Credit Retirement Options Like-for-like options

Ardeotis australis/ Australian Bustard	Spp		IBRA region
	Ardeotis australis/Australian Bustard		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	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.

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00018659/BAAS17033/19/00018660		12	24/01/2022
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Stephen Bloomfield	BAAS18054	Broken Hill Battery Storage - Stage 2_Transmission line	Finalised
Assessment Type	Date Finalised	BOS entry trigger	
Part 4 Developments (General)	24/01/2022	BOS Threshold: Area clearing threshold	

PCT list

Price calculated	PCT common name	Credits
Yes	155 - Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	7

Species list

Price calculated	Species	Credits
Yes	Ardeotis australis (Australian Bustard)	7

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

Assessment Id	Proposal Name
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 2_Transmission line

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Barrier Range	155 - Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	No	Gibber Chenopod Shrublands >=50% and <70%	18.87%	\$90.57	2.1967	\$2,782.19	7	\$19,475.34
Subtotal (excl. GST)									\$19,475.34
GST									\$1,947.53
Total ecosystem credits (incl. GST)									\$21,422.87

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10063	Ardeotis australis (Australian Bustard)	Endangered	\$309.97	20.6900%	\$80.00	7	\$3,178.72
Subtotal (excl. GST)							\$3,178.72
GST							\$317.87



Biodiversity payment summary report

Total species credits (incl. GST)

\$3,496.59

Grand total

\$24,919.46

Annex 9. Ecosystem and species credits required (BAM-C Credit report) for the approved Project

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BEES site	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS18054	Finalised	24/01/2022
Assessment Revision	Assessment Type	BOS entry trigger
7	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* 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

BAM Credit Summary Report

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

1	155_Low03	Not a TEC	21.9	21.9	0.31	PCT Cleared - 50%	High Sensitivity to Potential Gain			1.75		3
											Subtotal	3
											Total	3

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
Ardeotis australis / Australian Bustard (Fauna)									
155_Low03	21.9	21.9	0.31			Endangered	Not Listed	False	3
								Subtotal	3

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BESS site	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
7	24/01/2022	BOS Threshold: Area clearing threshold

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

List of Species Requiring Survey

Name	Presence	Survey Months
<i>Ardeotis australis</i> Australian Bustard	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
<i>Swainsona flavicarinata</i> Yellow-Keeled Swainsona	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☒ Jun ☐ Jul ☐ Aug ☐ Sep ☒ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
<i>Swainsona murrayana</i> Slender Darling Pea	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☒ Oct ☐ Nov ☐ Dec ☒ Survey month outside the specified months?

BAM Candidate Species Report

<i>Swainsona viridis</i> Creeping Darling Pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr
		☐ May ☐ Jun ☐ Jul ☐ Aug
		☐ Sep ☒ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?

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	Ctenophorus mirrityana	Habitat constraints
Crowned Gecko	Lucasium stenodactylum	Habitat degraded Species is vagrant
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Major Mitchell's Cockatoo	Lophochroa leadbeateri	Habitat constraints
Mallee Golden Wattle	Acacia notabilis	Refer to BAR
Showy Indigo	Indigofera longibractea	Habitat constraints
Stimson's Python	Antaresia stimsoni	Habitat constraints
Thick-billed Grasswren (north-west NSW subspecies)	Amytornis modestus obscurior	Habitat degraded

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BEES site	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
7	BOS Threshold: Area clearing threshold	24/01/2022

* 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	Hieraaetus morphnoides	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones

BAM Predicted Species Report

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
-------------	-----------------	----------------------------



BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BEES site	24/11/2021
Assessor Name	Report Created	BAM Data version *
Stephen Bloomfield	24/01/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18054	Part 4 Developments (General)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
7	24/01/2022	BOS Threshold: Area clearing threshold

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
---	------	-----	-----------	------	-------------------------	------------------

BAM Vegetation Zones Report

1	155_Low03	155-Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	Low03	0.31	1	
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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BESS site	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Stephen Bloomfield	BAAS18054	50
Proponent Names	Report Created	BAM Case Status
	24/01/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
7	Part 4 Developments (General)	24/01/2022
BOS entry trigger	* 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.	
BOS Threshold: Area clearing threshold		

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

Assessment Id	Proposal Name	Page 1 of 4
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BESS site	



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

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	0.3	0	3	3

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_Low03	No	3	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_Low03	0.3	3.00

Credit Retirement Options

Like-for-like credit retirement options

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



BAM Biodiversity Credit Report (Like for like)

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BEES site	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Stephen Bloomfield	BAAS18054	50
Proponent Name(s)	Report Created	BAM Case Status
	24/01/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
7	Part 4 Developments (General)	24/01/2022
BOS entry trigger	* 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.	
BOS Threshold: Area clearing threshold		

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
None added

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Variations)

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	0.3	0	3	3.00
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
	Gibber Chenopod Shrublands This includes PCT's: 155, 156	Gibber Chenopod Shrublands >=50% and <70%	155_Low03	No	3
	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.				
	Variation options				
	Formation	Trading group	Zone	HBT	Credits
	Arid Shrublands (Chenopod sub-formation)	Tier 3 or higher threat status	155_Low03	No	3
	IBRA Region: Broken Hill Complex, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.				

BAM Biodiversity Credit Report (Variations)

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Ardeotis australis / Australian Bustard	155_Low03	0.3	3.00

Credit Retirement Options Like-for-like options

Ardeotis australis / Australian Bustard	Spp		IBRA region
	Ardeotis australis /Australian Bustard		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	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.

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00018659/BAAS17033/19/00018660		7	24/01/2022
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Stephen Bloomfield	BAAS18054	Broken Hill Battery Storage - Stage 1_BESS site	Finalised
Assessment Type	Date Finalised	BOS entry trigger	
Part 4 Developments (General)	24/01/2022	BOS Threshold: Area clearing threshold	

PCT list

Price calculated	PCT common name	Credits
Yes	155 - Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	3

Species list

Price calculated	Species	Credits
Yes	Ardeotis australis (Australian Bustard)	3

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

Assessment Id	Proposal Name
00018659/BAAS17033/19/00018660	Broken Hill Battery Storage - Stage 1_BESS site

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Barrier Range	155 - Bluebush shrubland on stony rises and downs in the arid and semi-arid zones	No	Gibber Chenopod Shrublands >=50% and <70%	18.87%	\$90.57	2.1967	\$2,782.19	3	\$8,346.58
Subtotal (excl. GST)									\$8,346.58
GST									\$834.66
Total ecosystem credits (incl. GST)									\$9,181.24

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10063	Ardeotis australis (Australian Bustard)		\$309.97	20.6900%	\$80.00	3	\$1,362.31
Subtotal (excl. GST)							\$1,362.31
GST							\$136.23



Biodiversity payment summary report

Total species credits (incl. GST)

\$1,498.54

Grand total

\$10,679.78

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Terrestrial
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Heritage management

Aboriginal heritage
Historical heritage
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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)

Appendix C

Aboriginal Cultural Heritage Assessment Report

Broken Hill Battery Energy Storage System Project Modification

Aboriginal Cultural Heritage Assessment Report

09-Feb-2022
Aboriginal Cultural Heritage Assessment Report

Broken Hill Battery Energy Storage System Project Modification

Aboriginal Cultural Heritage Assessment Report

Client: AGL Macquarie Pty Ltd

ABN: 18 167 589 494

Prepared by

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09-Feb-2022

Job No.: 60619153

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Quality Information

Document Broken Hill Battery Energy Storage System Project Modification

Ref 60619153

Date 09-Feb-2022

Prepared by Geordie Oakes

Reviewed by Andrew McLaren, Rachel O'Hara

Revision History

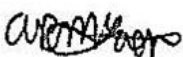
Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1	9-Dec-2021	Final for exhibition	Andrew McLaren (Principal Heritage Specialist)	

Table of Contents

Executive Summary	i
1.0 Introduction	1
1.1 Project Context and Overview	1
1.2 Assessment Background	1
1.3 Modification Area	1
1.4 Purpose of this Report	2
1.4.1 Assessment Objectives	2
1.5 Scope of Assessment	2
1.6 Structure of this Report	3
1.7 Project Team	3
2.0 Legislative and Policy Context	6
2.1 Commonwealth Legislation	6
2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)	6
2.1.2 Native Title Act 1993 (Cth)	6
2.1.3 Environment Protection and Biodiversity Conservation Act 1999 (Cth)	7
2.2 State Legislation	7
2.2.1 Environmental Planning and Assessment Act 1979 (NSW)	7
2.2.2 Aboriginal Land Rights Act 1983 (NSW)	8
2.2.3 National Parks and Wildlife Act 1974 (NSW)	8
2.3 Local Government	9
2.3.1 Broken Hill Local Environmental Plan 2013	9
3.0 Aboriginal Community Consultation	11
3.1 <i>Stage 1 - Notification and Registration</i>	11
3.1.1 <i>Consultation with Regulatory Agencies</i>	11
3.1.2 <i>Public Notification</i>	12
3.1.3 <i>Invitations for Expressions of Interest</i>	12
3.1.4 <i>Notification of Registered Aboriginal Parties (RAPs)</i>	13
3.2 Stage 2 - Presentation of Information about Project	13
3.3 Stage 3 – Gathering Information about Cultural Significance	13
3.3.1 Draft Assessment Methodology	13
3.4 Stage 4 - Review of Draft Assessment Report	13
4.0 Landscape Context	15
4.1 Physical Setting	15
4.2 Topography	15
4.3 Hydrology	15
4.4 Geology	16
4.5 Soils	16
4.6 Flora and Fauna	21
4.7 Historical Context and Land Use	21
4.8 Key Observations	26
5.0 Ethnohistoric Context	27
5.1 Introduction	27
5.2 Language Groups and Boundaries	27
5.3 Social Organisation	29
5.4 Ceremony and Ritual	29
5.5 Post-Contact History	30
6.0 Archaeological Context	31
6.1 Regional Context	31
6.2 Local Archaeological Context	32
6.2.1 AHIMS Database Search Results	32
6.3 Previous Archaeological Investigations within the Broken Hill Area	33
6.4 Archaeological Predictions	35
7.0 Archaeological Survey and Test Excavation	37
7.1 Archaeological Survey	37
7.1.1 Aim and Objectives	37

	7.1.2	Methodology	37
	7.1.3	Results	37
	7.2	Archaeological Test Excavation	42
	7.2.1	Purpose, Sampling Strategy & Methods	42
	7.2.2	Findings	44
	7.3	Aboriginal Sites	46
8.0		Significance Assessment	48
	8.1	Principles of Assessment	48
	8.2	Scientific Value	48
	8.3	Assessment of Scientific Significance	50
	8.4	Cultural Values	50
	8.5	Historic Value	51
	8.6	Aesthetic Value	51
	8.7	Statement of Significance	51
9.0		Impact Assessment	53
	9.1	Summary of Proposed Impacts	53
	9.2	Impacts to Identified Aboriginal Sites	53
	9.3	Cumulative Impact Assessment	56
	9.4	The Precautionary Principle	58
	9.5	Avoiding and Minimising Harm	58
10.0		Management Recommendations	60
	10.1	Statutory Requirements	60
	10.2	Management Strategy	60
	10.2.1	Movement of Aboriginal Objects	60
	10.2.2	Previously Unrecorded Aboriginal Objects and Places	60
	10.2.3	AHIMS Site Cards	60
	10.2.4	Aboriginal Site Inductions	60
	10.2.5	Management of Potential Human Remains	61
11.0		References Cited	62
Appendix A			
		Draft Assessment Methodology	A
Appendix B			
		Consultation Log	B
Appendix C			
		Lithics	C
Appendix D			
		Testing Notification	D
Appendix E			
		Test Pit Descriptions	E
Appendix F			
		Site Card	F

List of Figures

Figure 1	Regional context	4
Figure 2	Modification Area	5
Figure 3	Landform and Hydrology	17
Figure 4	Slope	18
Figure 5	Local elevation	19
Figure 6	Geology	20
Figure 7	Part of undated plan of the Parish of Nadbuck Approximate location of approved Project Area marked in red (Source: Land & Property Information NSW)	22
Figure 8	1982 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)	23

Figure 9	2004 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)	23
Figure 10	2010 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)	24
Figure 11	2015 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)	24
Figure 12	Disturbance	25
Figure 13	Tindale's 1940 Aboriginal Tribes of Australia	28
Figure 14	Aboriginal groups (Howitt 1904)	28
Figure 15	AHIMS sites	36
Figure 16	Archaeological survey and surface artefacts	41
Figure 17	Test pit locations	43
Figure 18	Aboriginal sites	47
Figure 19	Significance assessment	52
Figure 20	Impact assessment	55

List of Tables

Table 1	<i>Registered Aboriginal Parties</i>	12
Table 2	Site search results (10 x 10 km area)	33
Table 3	Survey field team	37
Table 4	Effective coverage data for the survey	38
Table 5	Simplified typological breakdown of surface artefacts	39
Table 6	Laboratory analysis results for soil samples	44
Table 7	Descriptive statistics for excavated 'A' soil horizons	44
Table 8	BESS-AS1-21 (23-4-0691)	46
Table 9	Values relevant to determining cultural significance, as defined by The Burra Charter (ICOMOS 2013)	48
Table 10	Scientific significance assessment	50
Table 11	Impact assessment for Aboriginal sites	54
Table 12	Land use analysis for study region (20 x 20 km)	57

Executive Summary

AECOM Australia Pty Ltd (AECOM) has been commissioned by AGL Macquarie Pty Ltd (AGLM) to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for a modification application under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to development consent SSD-11437498 received on 8 September 2021 for the Broken Hill Battery Energy Storage System (BESS) project located in Broken Hill in Far West New South Wales (NSW).

This Aboriginal Cultural Heritage Assessment Report (ACHAR) documents the results of AECOM's assessment and has been compiled with reference to relevant statutory guidelines including Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).

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

Following submission of the Environmental Impact Statement (EIS), Transgrid now requires that AGLM connect the BESS to an alternative location within the Transgrid Broken Hill substation. This alternative location is to the north of the previously identified connection point meaning that the transmission line would cross existing overhead transmission lines. While the approved Project assessed an overhead transmission connection, the requested modification from Transgrid has meant that the transmission line between the Site and the Transgrid Broken Hill substation may need to be installed underground between the Site and the Transgrid Broken Hill substation (the "Modification Area"). If installed underground, the transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximate 600 mm wide trench using a rubber tracked mini excavator or similar to minimise any potential environmental impacts;
- require a disturbance footprint approximately 4 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

Aboriginal community consultation for the current assessment and the broader EIS was undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) (Consultation Requirements) and clause 60 of the *National Parks and Wildlife Regulation 2019* (NSW). Stage 1 of the Consultation Requirements, related to identifying the relevant parties to consult with, was recently completed as part of the broader EIS Project. Consultation with the RAPs identified as part of the broader EIS was undertaken for the modification application.

The land classified as Commons, where the transmission line is proposed, is subject to an undetermined Aboriginal Land Claim number 40469 lodged by the NSW Aboriginal Land Council (NSWALC). It is noted the AGLM has undertaken consultation with the Broken Hill Local Aboriginal Local Aboriginal Land Council (BHLALC) and the NSWALC over the land claim.

A search of the AHIMS database undertaken on 25 November 2021 for a 10 x 10 km area centred on the Modification Area, extending 5 km to the north, south, east and west, resulted in the identification of 51 Aboriginal sites, comprising 41 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site.

At the request of the Registered Aboriginal Parties (RAPs), a two day program of archaeological test excavation was completed across the Modification Area on 17 and 18 November 2021. A field team of three AECOM heritage specialists and RAP representatives completed the archaeological survey across the Modification Area. A total of 11 Aboriginal artefacts were identified during the archaeological

survey. The artefacts were recorded scattered over an area roughly 5 m x 2 m in size and are considered to comprise a single artefact scatter site designated - BESS-AS1-2021.

Archaeological test excavation was undertaken in a single phase with 10 x 0.25 m² test pits excavated at 10 m intervals along the transmission line easement. Originally, 17 test pits were proposed at 20 m intervals along the transmission line corridor, however, during the archaeological survey significant ground surface disturbances were noted directly adjacent to Transgrid Broken Hill substation. Given the noted constraints, only ten (10) test pits were ultimately excavated within the transmission easement corridor. This reduction was discussed with and supported by the RAPs present. No Aboriginal artefacts were identified during the subsurface excavation program.

BESS-AS1-21 (23-4-0691) has been assessed as of low scientific significance, both on the basis of its contents and also its poor, disturbed condition. The proposed works within the Modification Area are anticipated to directly impact BESS-AS1-21 (23-4-0691). Consideration of the location of the site in relation to the proposed works indicates that it is located partially within the Modification Area and would therefore be partially impacted. However, given the proximity to the Modification Area, and the potential for inadvertent impacts, it is assumed that the entire site would be impacted.

In order to mitigate the impact of the proposed works on BESS-AS1-21 (23-4-0691), it is recommended that all surface artefacts present within the boundary of this site be relocated to an area nearby that would not be impacted by the modification. Artefact relocation should 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 should be updated to reflect implementation of this mitigation measure.

This strategy should be included in the Project's (as modified) Aboriginal Cultural Heritage Management Plan (ACHMP).

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned by AGL Macquarie Pty Ltd (AGLM) to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for a modification application under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to development consent SSD-11437498 received on 8 September 2021 for the Broken Hill Battery Energy Storage System (BESS) project located in Broken Hill in Far West New South Wales (NSW) (**Figure 1**).

This Aboriginal Cultural Heritage Assessment Report (ACHAR) documents the results of AECOM's assessment and has been compiled with reference to relevant statutory guidelines including Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).

1.1 Project Context and Overview

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

Following submission of the Environmental Impact Statement (EIS), Transgrid now requires that AGLM connect the BESS to an alternative location within the Transgrid Broken Hill substation. This alternative location is to the north of the previously identified connection point meaning that the transmission line would cross existing overhead transmission lines. While the approved Project assessed an overhead transmission connection, the requested modification from Transgrid has meant that the transmission line between the Site and the Transgrid Broken Hill substation may need to be installed underground between the Site and the Transgrid Broken Hill substation (within the "Modification Area") in part or in full. If installed underground, the transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximate 1180 mm deep and 720 mm wide trench using a rubber tracked mini excavator or similar to minimise any potential environmental impacts;
- require a disturbance footprint approximately 20 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

1.2 Assessment Background

In early 2021, AECOM completed an ACHAR for the approved Project that was used to support the EIS. As part of the assessment, a field team of two AECOM heritage specialists and Registered Aboriginal Parties (RAPs) representatives completed the archaeological survey within the Site and transmission line corridor on Wednesday 20 January 2021. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey. RAPs identified two lithic items they considered might potentially be artefacts. While neither item satisfied technical criteria for identification as a stone artefact, as a precautionary measure, both items were moved outside of areas of potential ground surface disturbance by the attending RAP field representatives. The report was finalised and used to support the EIS to obtain development consent.

1.3 Modification Area

The Modification Area for the modification application, as shown on **Figure 2**, comprises the new approximately 360 m long underground transmission line alignment between the Site and the Transgrid Broken Hill substation. Land within the Modification Area is generally undisturbed and not in use, with the exception of dirt access roads adjacent to the Transgrid Broken Hill Substation.

Reference to the Geographical Names Board of NSW confirms that the Modification Area falls wholly within the boundaries of the Broken Hill Local Government Area (LGA), within the parish of Nadbuck in the County of Yancowinna. Surrounding villages include Stephens Creek to the north, Silverton and Burns to the west, and Mount Gipps to the east.

1.4 Purpose of this Report

1.4.1 Assessment Objectives

The overarching objectives of this ACHAR are as follows:

- to identify the Aboriginal cultural heritage values of the Modification Area by way of background research, archaeological survey and test excavation, and consultation with RAPs
- to assess the potential impact of the modification on the identified Aboriginal cultural heritage values of the Modification Area
- to provide an appropriate management strategy for avoiding or minimising potential harm to the identified Aboriginal cultural heritage values of the Modification Area
- to compile an ACHAR that will assist the Secretary of the Department of Planning and Environment (DPE) in their assessment of the modification application.

1.5 Scope of Assessment

This assessment has been undertaken with reference to the following guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a)
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b)
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia International Council on Monuments and Sites [ICOMOS] 2013)
- *Ask First: A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission 2002)

As such, its key requirements have been:

- to conduct a search of Heritage NSW's AHIMS register
- to review the landscape context of the Modification Area, with specific consideration to its implications for past Aboriginal land use
- to review relevant archaeological and ethnohistoric information for the Modification Area and environments
- to prepare a predictive model for the Aboriginal archaeological record of the Modification Area
- to undertake an archaeological field investigation, including survey and test excavation
- to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Modification Area
- to provide RAPs with information about the scope of the proposed works and Aboriginal heritage assessment process
- to facilitate a process whereby RAPs can:
 - contribute culturally appropriate information to the proposed assessment methodology
 - provide information that will enable the cultural significance of Aboriginal objects and/or places within the Modification Area to be determined

- have input into the development of cultural heritage management options
- to prepare and finalise an ACHAR with input from RAPs.

1.6 Structure of this Report

The report structure is as follows:

- **Section 1.0** provides background information on the modification and the assessment undertaken.
- **Section 2.0** outlines the statutory framework within which this assessment has been undertaken
- **Section 3.0** details the Aboriginal community consultation program undertaken for this assessment
- **Section 4.0** describes the existing environment of the Modification Area and its associated archaeological implications
- **Section 5.0** summarises relevant ethnohistoric information for the Modification Area
- **Section 6.0** describes the archaeological context of the Modification Area on a regional and local scale. Predictions regarding the nature of the Modification Area's Aboriginal archaeological record are also provided
- **Section 7.0** describes the archaeological survey and test excavation methodology and results
- **Section 8.0** assesses the archaeological (scientific) and cultural significance of Aboriginal sites within the Modification Area
- **Section 9.0** provides an assessment of the potential impacts of the modification on identified Aboriginal heritage values
- **Section 10.0** details an appropriate management strategy for the identified Aboriginal heritage values of the Modification Area
- **Section 11.0** lists the references cited in-text.

1.7 Project Team

Geordie Oakes (Principal Heritage Specialist, AECOM) managed all aspects of the Aboriginal heritage assessment detailed herein and was the primary author of this report. Dr Andrew McLaren (Principal Heritage Specialist, AECOM) and Rebecca Hibberd (Graduate Heritage Specialist, AECOM) assisted Geordie with the fieldwork and provided technical review of this assessment report.

The archaeological survey and test excavation was undertaken by a combined field team of three AECOM archaeologists (Geordie, Andrew and Rebecca) and RAP field representatives.

Geordie holds a Bachelor of Arts (Honours) degree in historic and prehistoric Archaeology from Sydney University and a Graduate Certificate in Paleo-anthropology from the University of New England. Geordie has over 14 years of Australian Aboriginal cultural heritage management experience.

Andrew holds a Bachelor of Arts (Honours) degree from the University of Queensland, a Master of Cultural Heritage from Deakin University, and a PhD from the University of Cambridge in England and has over 10 years of Australian Aboriginal cultural heritage management experience.

Figure 1 Regional context

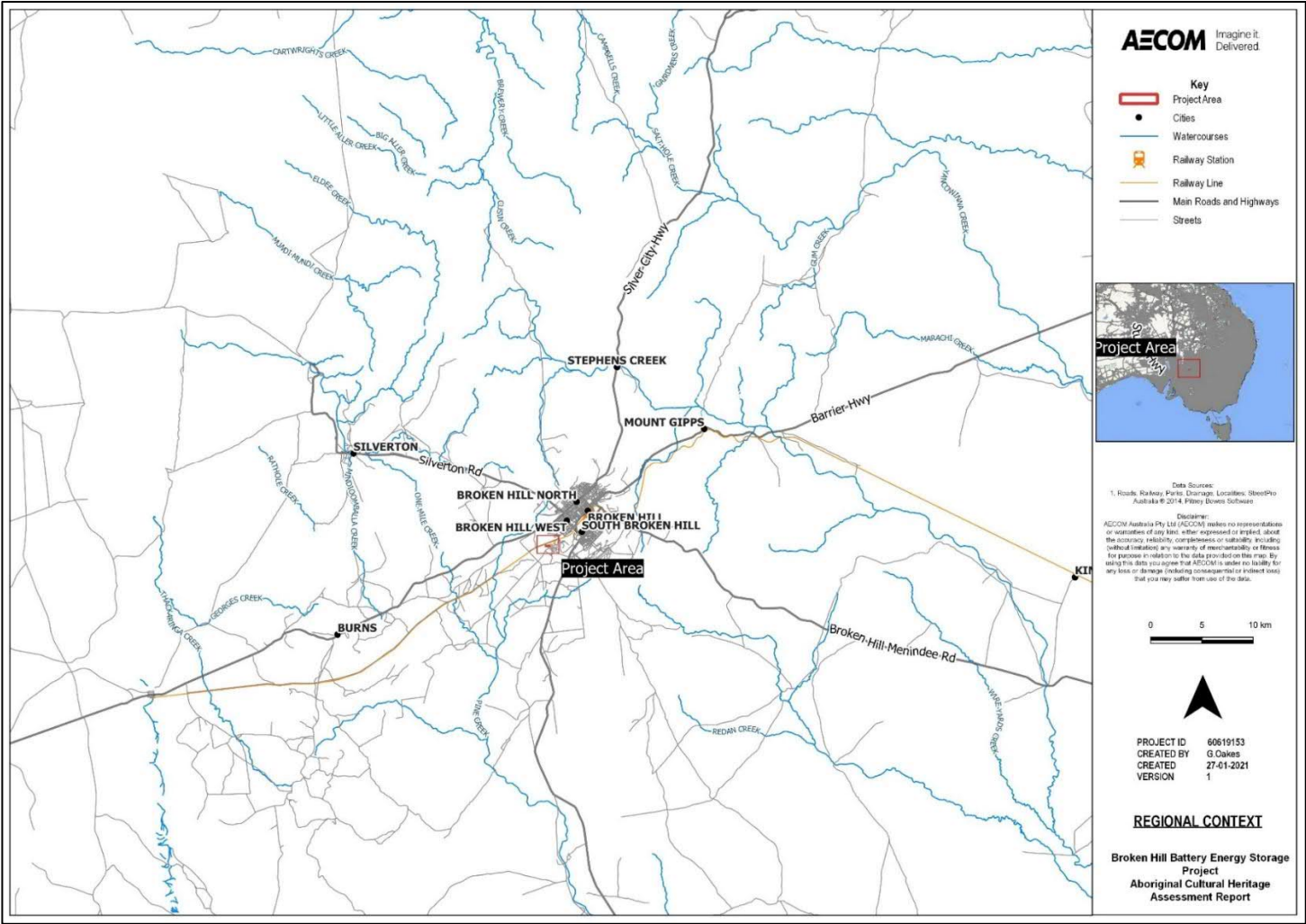
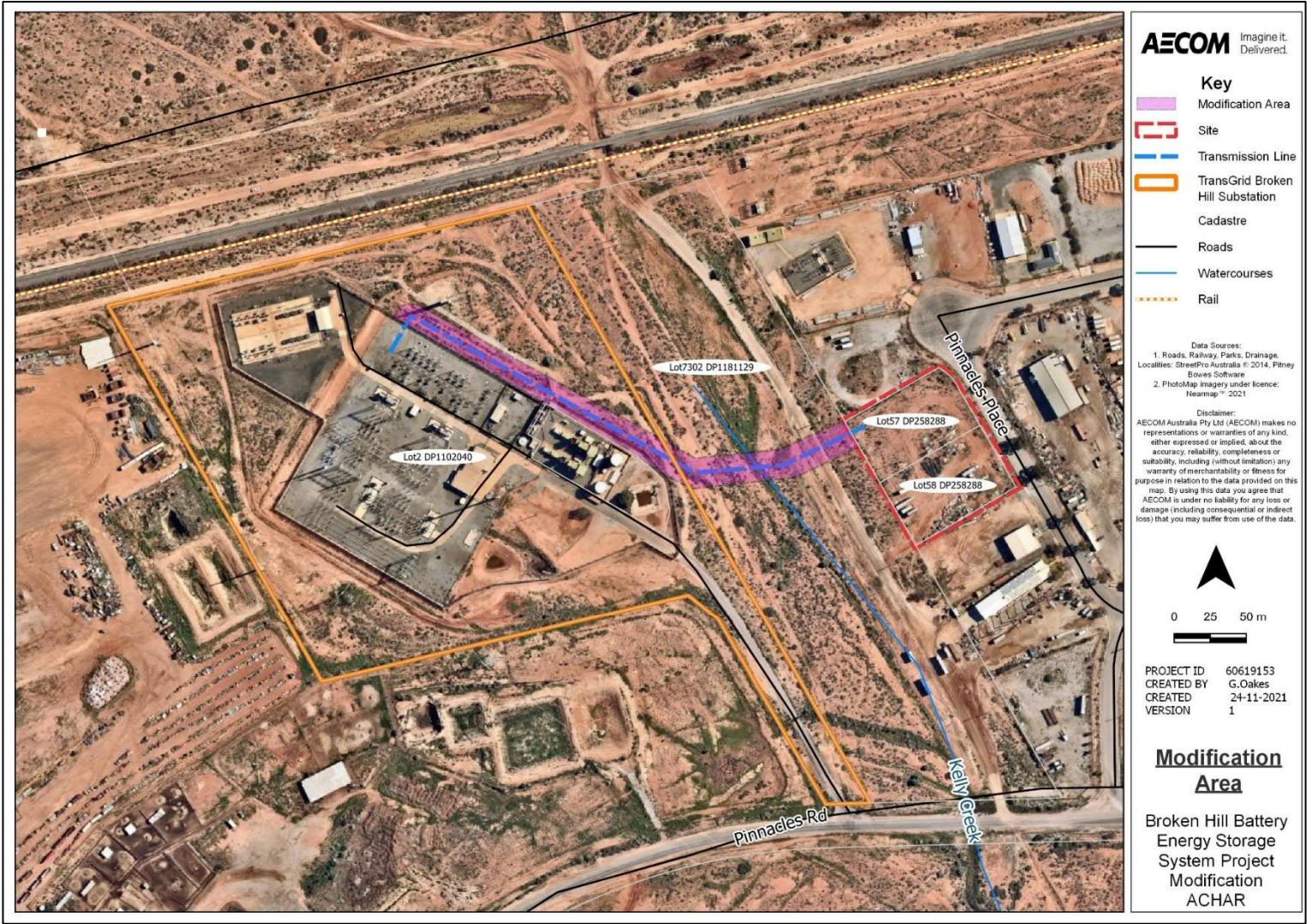


Figure 2 Modification Area



2.0 Legislative and Policy Context

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) (ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the “*preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition*” (Part I, Section 4).

Under the ATSIHP Act, ‘*Aboriginal tradition*’ is defined as “*the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships*” (Part I, Section 3). A ‘*significant Aboriginal area*’ is an area of land or water in Australia that is of “*particular significance to Aboriginals in accordance with Aboriginal tradition*” (Part I, Section 3). A ‘*significant Aboriginal object*’, on the other hand, refers to an object (including Aboriginal remains) of like significance (Part 1, Section 3).

For the purposes of the ATSIHP Act, an area or object is considered to have been injured or desecrated if:

- a. *In the case of an area:*
 - i. *it is used or treated in a manner inconsistent with Aboriginal tradition;*
 - ii. *by reason of anything done in, on or near the area, the use or significance of the area in accordance with Aboriginal tradition is adversely affected; or*
 - iii. *passage through or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition; or*
- b. *In the case of an object – it is used or treated in a manner inconsistent with Aboriginal tradition;*

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long-term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate Minister of that state or territory (Part 2, Section 13).

No declarations relevant to the Modification Area have been made under the ATSIHP Act.

2.1.2 Native Title Act 1993 (Cth)

The *Native Title Act 1993* (Cth) (NTA) provides for the recognition and protection of native title for Aboriginal peoples and Torres Strait Islanders. The NTA recognises native title for land over which native title has not been extinguished and where persons able to establish native title are able to prove continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed as well as a framework for notification of native title stakeholders for certain future acts on land where native title has not been extinguished.

Searches of the *Schedule of Applications (unregistered claimant applications)*, *Register of Native Title Claims*, *National Native Title Register*, *Register of Indigenous Land Use Agreements* and *Notified Indigenous Land Use Agreements* were undertaken for the Modification Area on 20 December 2021 using the NNTT Native Title Vision online system. It is noted that Lots 57 and 58 on DP258288 and Lot 2 DP1102040 are freehold land whilst Lot 7302 on DP1181129 is freehold land that is owned by NSW government and is classified as Commons. The parcel of Commons is subject to undetermined Native Title Compensation Claim by the Barkandji Malyangapa People (NP2020/001). A previous Native Title

Claim by the Barkandji Traditional Owners #8 (Part A) for the Commons was determined on 16 Jun 2015 with Native Title ruled as being extinguished.

2.1.3 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) took effect on 16 July 2000. Under Part 9 of the EPBC Act, any action that has, or is likely to have a significant impact on a 'matter of national environmental significance' may only progress with approval of the Commonwealth Minister for the Environment (or delegate). An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

- it is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- it is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; or
- it is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines 'environment' as incorporating both natural and cultural environments and therefore includes Aboriginal heritage. Under the EPBC Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) (NHL) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies) (CHL). These two lists replaced the Register of the National Estate (RNE), which was closed in 2007 and is no longer a statutory list. Statutory references to the RNE in the EPBC Act were removed on 19 February 2012. However, the RNE remains an archive of over 13,000 heritage places throughout Australia.

A search of the Australian Heritage Database, which includes places listed on the World Heritage List (WHL), NHL, CHL, RNE and List of Overseas Places of Historic Significance to Australia, was undertaken in January 2021. One item, the entire Broken Hill Local Government Area (LGA), is listed on the NHL.

Under the EPBC Act, activities that have the potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Energy for assessment. An EPBC referral was submitted in January 2021. The EPBC referral was determined on 7 May 2021, and confirmed that the approved Project did not constitute a controlled action (EPBC 2021/8918). As stated in the determined EPBC referral, *The Project would consist of the following: Connection of the BESS facility to the nearby Transgrid Broken Hill substation via a 22kV overhead or if required underground powerline connecting through a 22kV busbar in the substation.* The determined EPBC referral submitted for the approved Project captured the possibility of the underground installation of the transmission lines and, therefore, a new EPBC referral for the modification is not necessary as the modification does not constitute a controlled action.

On this basis, an updated EPBC referral has not been referred to the Commonwealth Minister for Environment and Energy.

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979 (NSW)

The *Environmental Planning and Assessment Act* (NSW) (EP&A Act) is administered by DPE and requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts include impacts to Aboriginal and non-Aboriginal (i.e. European) cultural heritage.

Section 4.36 of the EP&A Act stipulates that a development will be considered State Significant Development (SSD) if it is declared to be such by a State environmental planning policy (SEPP).

Under clause 8(1) of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), a development is declared to be SSD if:

- a. the development on the land concerned is, by the operation of an environmental planning instrument, permissible with development consent under Part 4 of the EP&A Act; and
- b. the development is specified in Schedule 1 or 2 of SRD SEPP.

The Project (as modified) is SSD as it meets both of these criteria, namely:

- it is permissible with development consent on the land on which it is located; and
- it is development that is specified in Schedule 1 of SEPP SRD.

Pursuant to section 4.41 of the EP&A Act, Aboriginal Heritage Impact Permits (AHIPs) are not required for projects classified as SSD and authorised by a development consent granted under Part 4 of the EP&A Act. Impacts to Aboriginal heritage values associated with approved SSD projects are typically managed under Aboriginal Cultural Heritage Management Plans (ACHMPs), required under the conditions of the consent. ACHMPs are statutorily binding once approved by DPE.

2.2.2 Aboriginal Land Rights Act 1983 (NSW)

The *Aboriginal Land Rights Act 1983* (NSW) (ALR Act) was established to return land in NSW to Aboriginal peoples through a process of lodging claims for certain Crown reserves. The ALR Act, is administered by the NSW Department of Aboriginal Affairs and establishes a compensatory regime which recognises that land is of spiritual, social, cultural and economic importance to Aboriginal people. The ALR Act established the NSW Aboriginal Land Council (NSWALC) and a network of over 120 autonomous Local Aboriginal Land Councils (LALCs) and requires these bodies to:

- a. take action to protect the culture and heritage of Aboriginal persons in the LALC's area, subject to any other law; and
- b. promote awareness in the community of the culture and heritage of Aboriginal persons in the LALC's area.

LALCs constituted under the ALR Act can make claims. The Registrar of the ALR Act must maintain the Register of Aboriginal Land Claims under section 166 of the ALR Act. All land claims that have been made under the Act are recorded in the Register.

The land classified as Commons, where the transmission line is proposed, is subject to an undetermined Aboriginal Land Claim number #40469 lodged by the NSWALC. It is noted the AGLM has undertaken consultation with Broken Hill Local Aboriginal Land Council (BHLALC) and the NSWALC over the land claim.

2.2.3 National Parks and Wildlife Act 1974 (NSW)

The NPW Act, administered by Heritage NSW, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Secretary of Heritage NSW responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined as follows:

- An *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- An *Aboriginal place* is a place so declared by the Minister under section 84 of the NPW Act because in the opinion of the Minister, the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.

Section 86 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them and includes a 'strict liability offence' for such harm under sections 86(2) and (4). A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted. Defences against the 'strict liability offence' under section 87 of the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in clause 58 of the *National Parks and Wildlife Regulation 2019* (NSW) (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (AHIP) issued under section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. Applications for an AHIP must be accompanied by assessment reports compiled in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b). Applications must also

provide evidence of consultation with the Aboriginal communities. Consultation is required under Section 60 of the NPW Regulation and is to be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

As indicated above, pursuant to section 4.41 of the EP&A Act, AHIPs are not required for projects classified as SSD and approved under Part 4 of the EP&A Act, with impacts typically managed under ACHMPs required under the conditions of the consent. ACHMPs are statutorily binding once approved by the DPE.

Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances, including for SSD projects (including modifications).

2.3 Local Government

2.3.1 Broken Hill Local Environmental Plan 2013

Clause 5.10 of the *Broken Hill Local Environmental Plan 2013* (BHLEP 2013) provides specific provisions for the protection of heritage items, heritage conservation areas, archaeological sites, Aboriginal objects and Aboriginal places of heritage significance within the Broken Hill LGA.

Under clause 5.10(2) of the BHLEP 2013, development consent is required for any of the following:

- a. demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):
 - (i) a heritage item,
 - (ii) an Aboriginal object,
 - (iii) a building, work, relic or tree within a heritage conservation area,
- b. altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,
- c. disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,
- d. disturbing or excavating an Aboriginal place of heritage significance,
- e. erecting a building on land:
 - (i) on which a heritage item is located or that is within a heritage conservation area, or
 - (ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,
- f. subdividing land:
 - (i) on which a heritage item is located or that is within a heritage conservation area, or
 - (ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

In relation to Aboriginal heritage, clause 5.10(8) of the BHLEP 2013 states the consent authority must, before granting consent to the carrying out of development in an Aboriginal place of heritage significance:

- a. consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and

- b. notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.

Schedule 5 of the BHLEP 2013 lists heritage items, conservation areas and archaeological sites within the Broken Hill LGA. A review of the list indicates there are no Aboriginal objects or places of heritage significance located within the Modification Area.

3.0 Aboriginal Community Consultation

Aboriginal community consultation acknowledges the right of Aboriginal people to be involved, through direct participation, on matters that directly affect their heritage. Involving Aboriginal people in all facets of the assessment process ensures that they are given adequate opportunity to share information about cultural values, and actively participate in developing appropriate management and/or mitigation measures. The successful identification, assessment and management of Aboriginal cultural heritage values are dependent on an inclusive and transparent consultation process.

Aboriginal community consultation for the current assessment was undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) (Consultation Requirements) and clause 60 of the *National Parks and Wildlife Regulation 2019* (NSW). The results of the consultation process undertaken are detailed below.

Stage 1 of the Consultation Requirements, related to identifying the relevant parties to consult with, was recently completed as part of the broader EIS Project and AGLM/AECOM have maintained ongoing consultation and engagement with these groups since their individual expressions of interest (including during development of the approved ACHMP). A description of Stage 1 of the Consultation Requirements completed for the broader EIS Project is provided in Section 3.1. Consultation with these same RAPs, identified as part of the broader EIS, is considered appropriate for this modification application. Consultation completed as part of the broader EIS to identify RAPs is provided as *italicised* text below.

3.1 Stage 1 - Notification and Registration

The aim of Stage 1 of the Consultation Requirements is to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Modification Area. As noted above, this part of the consultation program was completed as part of the broader EIS Project.

3.1.1 Consultation with Regulatory Agencies

Section 4.1.2 of the Consultation Requirements stipulate that proponents are responsible for ascertaining, from reasonable sources of information, the names of Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places. Proponents are required to compile a list of Aboriginal people who may have an interest for the proposed Project Area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places by writing to:

- a. the relevant regional office of the Heritage NSW*
- b. the relevant Local Aboriginal Land Council(s) (LALCs)*
- c. the Registrar, Aboriginal Land Rights Act 1983 for a list of Aboriginal owners*
- d. the National Native Title Tribunal (NNTT) for a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements*
- e. NTSCORP Limited*
- f. the relevant local council(s)*
- g. the relevant catchment management authorities for contact details of the established Aboriginal reference group (now Local Land Services).*

In accordance with this requirement, the following agencies were contacted via letter or email on 11 September 2020 requesting information on relevant Aboriginal persons and organisations:

- Heritage NSW*
- Broken Hill Local Aboriginal Land Council (BHLALC)*
- Office of the Registrar, Aboriginal Land Rights Act 1983 (NSW)*
- National Native Title Tribunal*

- NTSCORP Limited
- City of Broken Hill Council
- Western Local Land Service.

In addition to the above, searches of the NNTT Native Title Vision online system, were undertaken to determine if there were any Native Title registrations or determinations, or Aboriginal Land Claims relevant to the Project Area. As noted in **Section 2.1.2**, Lots 57 and 58 on DP258288 and Lot 2 DP1102040 are freehold land whilst Lot 7302 on DP1181129 is freehold land that is owned by NSW government and is classified as Commons.

The parcel of Commons is subject to undetermined Native Title Compensation Claim by the Barkandji Malyangapa People (NP2020/001) as well as being subject to an undetermined Aboriginal Land Claim number #40469. A previous Native Title Claim by the Barkandji Traditional Owners #8 (Part A) for the Commons was determined on 16 June 2015 with Native Title ruled as being extinguished. AGLM has undertaken direct consultation with BHLALC and the NSWALC over the lands where there is the undetermined Aboriginal Land Claim.

3.1.2 Public Notification

Section 4.1.3 of the Consultation Requirements requires that, in addition to writing to the Aboriginal people identified by the agencies listed in **Section 3.1.1**, the proponent must also place a notice in the local newspaper circulating in the general location of the proposed project. The notification must outline the project and identify its location.

In accordance with this requirement, a public notice was placed in the Barrier Daily Truth on Wednesday 25 November 2020. The closing date for registration via this notice was 10 December 2020, which provided the necessary minimum 14-day period for expressions of interest.

No registrations were received in response to the public notice.

3.1.3 Invitations for Expressions of Interest

Section 4.1.3 of the Consultation Requirements requires that proponents must write to the Aboriginal people whose names were obtained through the regulatory agencies and the relevant LALC(s) to notify them of the proposed project and invite them to register an interest in participating in a process of community consultation.

In accordance with this requirement, on 3 December 2020, a letter inviting expressions of interest and containing summary information on the project was sent to all Aboriginal persons and organisations identified by the regulatory agencies. The closing date for registrations was 18 December 2020 allowing the necessary minimum 14-day period for expressions of interest (EOI).

A total of four Aboriginal organisations registered an interest in the project. Summary information on all RAPs, including registration dates, is provided in **Table 1**. In accordance with Section 4.1.5 of the Consultation Requirements, AECOM provides the opportunity for RAPs to withhold their details from being forwarded on to the Local Aboriginal Land Council and/or Heritage NSW, and respects the wishes of RAPs to withhold their details at their discretion. No RAPs requested that their details be withheld in regard to this project.

Table 1 Registered Aboriginal Parties

Organisation	Date of registration	Method	Contact Person
Cally Doyle	11-Dec-20	Email	Cally Doyle
Wilyakali Aboriginal Corporation	18-Dec-20	Phone	Maureen O'Donnell
BHLALC	24-Nov-20	Phone	Joanne O'Donnell
Barkanndji #8 Native Title Determinants	11-Jan-21	Phone	Derek Hardman

3.1.4 Notification of Registered Aboriginal Parties (RAPs)

Section 4.1.6 of the Consultation Requirements requires that the proponent make a record of the names of each Aboriginal person who registered an interest and provide a copy of that record, along with a copy of the EOI letter forwarded to the Aboriginal parties, to the relevant Heritage NSW regional office and LALC. Section 4.1.5 of the Consultation Requirements provides the opportunity for Aboriginal persons to withhold their details from being forwarded to these parties.

In accordance with these requirements, on 25 January 2021, a list of all RAPs was forwarded to the relevant Heritage NSW regional office and the BHLALC. A copy of the EOI letter and the newspaper advertisement was included in this correspondence.

3.2 Stage 2 - Presentation of Information about Project

The aim of Stage 2 of the Consultation Requirements is to provide RAPs with information about the scope of the proposed project and the proposed cultural heritage assessment process.

Information about the, now approved, broader Project was provided to RAPs as part of the registration of interest process detailed in **Section 3.1.3**. Information on the modification application was provided to RAPs as part of the draft assessment methodology sent out on 7 October 2021.

3.3 Stage 3 – Gathering Information about Cultural Significance

The aim of Stage 3 of the Consultation Requirements is to facilitate a process whereby RAPs can:

- a. Contribute to culturally appropriate information gathering and the assessment methodology
- b. Provide information that will enable the cultural significance of Aboriginal objects and/or places on the proposed Project Area to be determined
- c. To have input into the development of any cultural heritage management measures.

Consultation with RAPs regarding the cultural heritage values of the approved Project Area as well as the modification application included:

- A request with the draft assessment methodology for any initial comments regarding the Aboriginal cultural heritage values of the Project Area
- Discussion of cultural heritage values during fieldwork
- Provision of a draft report to all RAPs for comment prior to finalisation and a follow up email to obtain comments.

3.3.1 Draft Assessment Methodology

Sections 4.3.1 and 4.3.2 of the Consultation Requirements require that the proponent present and/or provide the proposed methodology for the cultural heritage assessment to RAPs and that RAPs be given a minimum of 28 days to review and provide feedback on this methodology (**Appendix A**).

On 7 October 2021, all RAPs were provided by mail/email with a draft of AECOM's proposed assessment methodology for the modification application. On 15 October 2021 the methodology for the modification application was modified based on a request by a RAP to complete archaeological test excavation within the Modification Area. The updated methodology was provided to RAPs with the closing date for comments on 4 November 2021. In total a 28 day review period was provided for RAP review of the methodology.

No written responses were received on the proposed modification methodology. However, a RAP contacted AGLM directly to request archaeological test excavation be completed over the Modification Area. This request was incorporated into an updated methodology.

3.4 Stage 4 - Review of Draft Assessment Report

The aim of Stage 4 of the Consultation Requirements is to prepare and finalise an ACHAR with input from RAPs.

In accordance with Section 4.4.2 of the Consultation Requirements, all RAPs were sent a draft of this ACHAR on 15 December 2021 for review and comment (either by email or mail). As no responses were received within 28 days a follow up email was sent on 14 January 2022. No responses were received from RAPs regarding the draft ACHAR.

A consultation log for the ACAHR is provided as **Appendix B**.

4.0 Landscape Context

This section reviews the landscape context of the Modification Area as a basis for predicting the character of past Aboriginal occupation within it and its associated archaeological record. Consideration of the landscape context of the Modification Area is based on the now well-established proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local flora and fauna communities will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country. Amongst other things, these variables will have affected the availability of suitable campsites, drinking water, economic¹ plant and animal resources, and raw materials for the production of stone and organic implements. At the same time, an assessment of historical and contemporary land use activities, as well as geomorphic processes such as soil erosion and aggradation, is critical to understanding the formation and integrity of archaeological deposits, as well as any assessments of Aboriginal archaeological sensitivity.

4.1 Physical Setting

The Modification Area, as shown on **Figure 2**, comprises the new underground transmission line alignment between the Site and the Transgrid Broken Hill substation. Land within the Modification Area is generally undisturbed and not in use, with the exception of dirt access roads adjacent to the Transgrid Broken Hill Substation.

Reference to the Geographical Names Board of NSW confirms that the Modification Area falls wholly within the boundaries of the Broken Hill LGA within the parish of Nadbuck in the County of Yancowinna. Surrounding villages include Stephens Creek to the north, Silverton and Burns to the west, and Mount Gipps to the east.

4.2 Topography

The Modification Area lies within the Barrier Ranges sub-region of the Broken Hill Complex Bioregion, an area generally characterised by steep, low rocky ranges with eroded foot slopes extending to out-washed fans (Sahukar, Gallery, Smart, & Dunn, 2003). Mapped as occupying the lower slopes and outwash area of the southern Barrier Ranges, the topography of the Modification Area comprises an area of level to very gently inclined south facing slope that is barely perceptible “on the ground” (**Figure 3** and **Figure 4**). Far to the north of the Modification Area the foot slopes rise to hills of the ranges proper, while to the south the slopes grade towards plains of the Barrier Downs subregion. Elevations across the Modification Area range from 287 AHD to 288 m AHD, providing a total local relief of 1 m indicating that the Modification Area is generally level (**Figure 5**).

4.3 Hydrology

The Modification Area is located within the Upper Darling catchment, with the Darling River itself located approximately 100 km to the southeast of the Modification Area. The Darling River is the most significant watercourse in the Broken Hill region flowing in a south-westerly direction from its headwaters in Queensland to its confluence with the Murray River in Wentworth, NSW. One ephemeral drainage channel is located directly within the Modification Area, the upper portion of a 1st order ephemeral tributary of Kellys Creek, whose central channel is located 5.5 km south of the Modification Area (**Plate 1**). The channel of the ephemeral drainage line is barely perceptible and only holds water during rain and flood events. Kelly’s Creek is a 4th order locally significant watercourse which, like its tributaries, only flows during rain events.

¹i.e., edible and/or otherwise useful (e.g., medicine, clothing).



Plate 1 View southeast showing part of the 1st order ephemeral drainage line (Source: AECOM 2021)

4.4 Geology

As noted above, the Modification Area lies on the southern foot slopes of the Barrier Ranges - a triangular-shaped block of metamorphic and sedimentary rocks that form a series of generally north-east and north-west trending ridgelines that rise up to 300 m above the surrounding plains (Sahukar et al., 2003). Reference to the 1:100,000 Broken Hill Stratigraphy (Wills, 1989) map indicates the eastern half of the Modification Area falls within the Early Proterozoic antiquity Purnamoota (Bs) subgroup of the Willyama Supergroup (W) and the western half falls within the Sundown Group (S). The Purnamoota subgroup is described as a metasediment sequence with two horizons comprising basic and garnet rich gneisses, as well as “lode horizon” rocks such as quartz and garnet. Rocks of the Sundown Group comprise well bedded non-graphitic metasediment with pelite-psammopelite units most abundant in the lower half and Psammite-psammopelite units more common in the upper half.

4.5 Soils

Rock-weathering processes operating throughout the area continuously for more than 90 million years have formed a deep weathered mantle across the landscape with soils varying with their associated bedrock parent materials. The Land Systems of Western New South Wales (1991) report classifies the Modification Area as belonging to the Nine Mile (Nm) Land System, a large but somewhat dispersed system found associated with the Barrier Ranges. The Nine Mile Land System is described topographically as comprising lower slopes and outwash areas of the Barrier Ranges. Specifically, soils occupying foot slopes of the Barrier Ranges are characterised as weakly banded, red texture contrast soils with slight expressions of surface quartz. Erosion in this land system is widespread, both as being part of foot slopes as well as resulting from European land practices (see Fanning, 1999) that have exacerbated wind erosion, scalding, watersheeting and areas of riling and gullyng. Similarly, reference to the Broken Hill Domain 1:100,000 Regolith-Landform Map indicates the soils within the Modification Area comprise quartzose and lithic gravels/sands with minor red-brown sands.

Figure 3 Landform and Hydrology

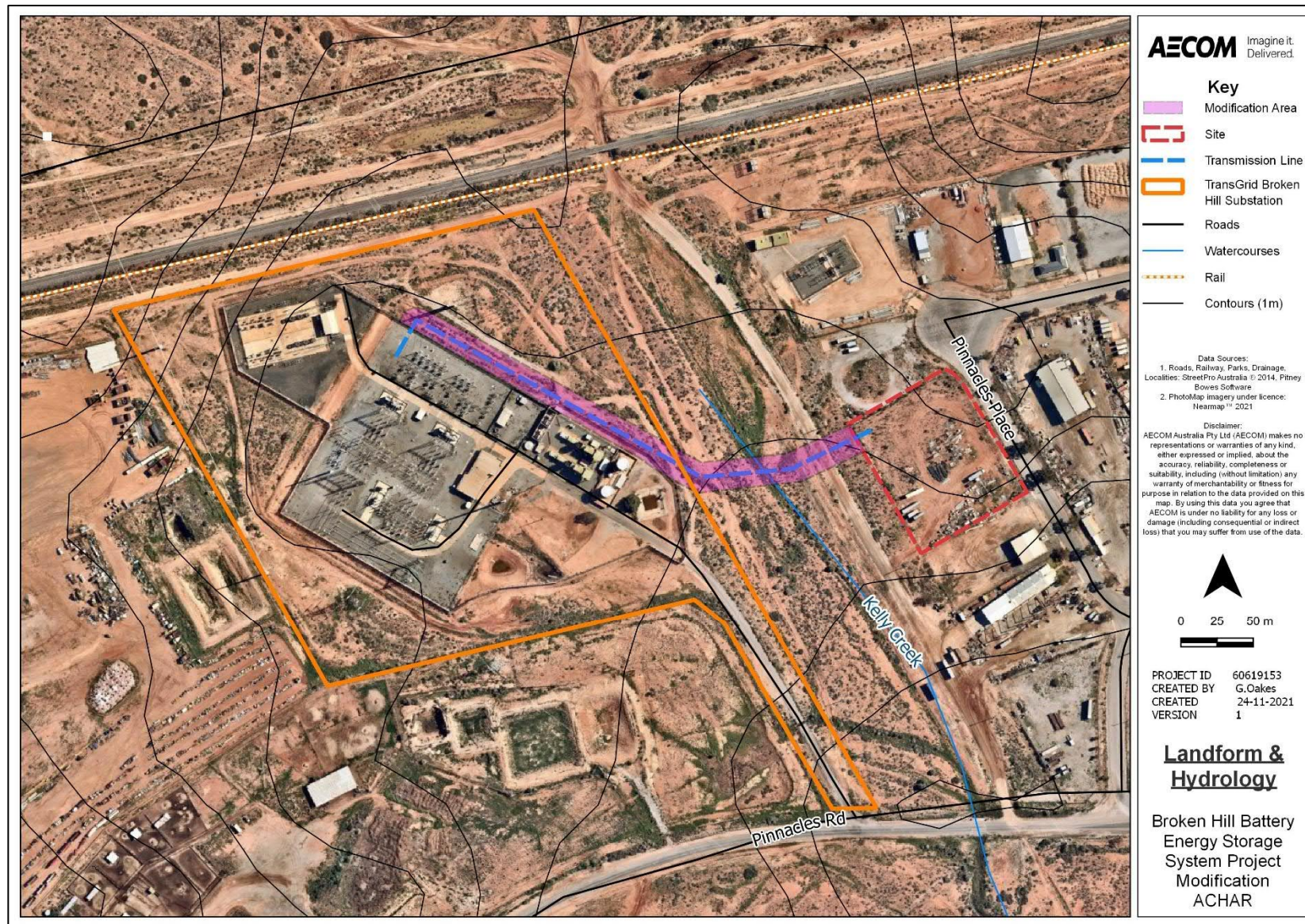


Figure 4 Slope

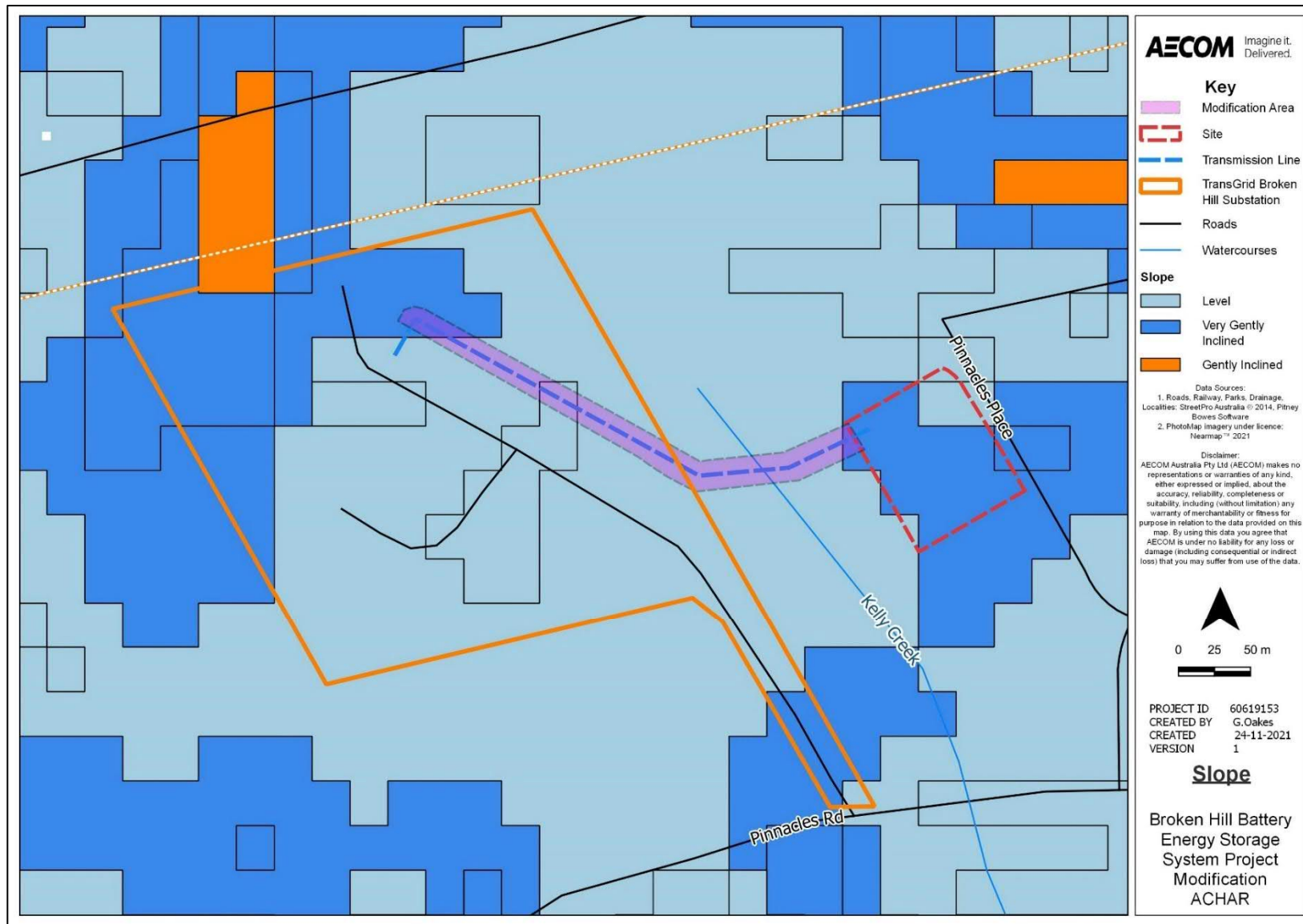


Figure 5 Local elevation

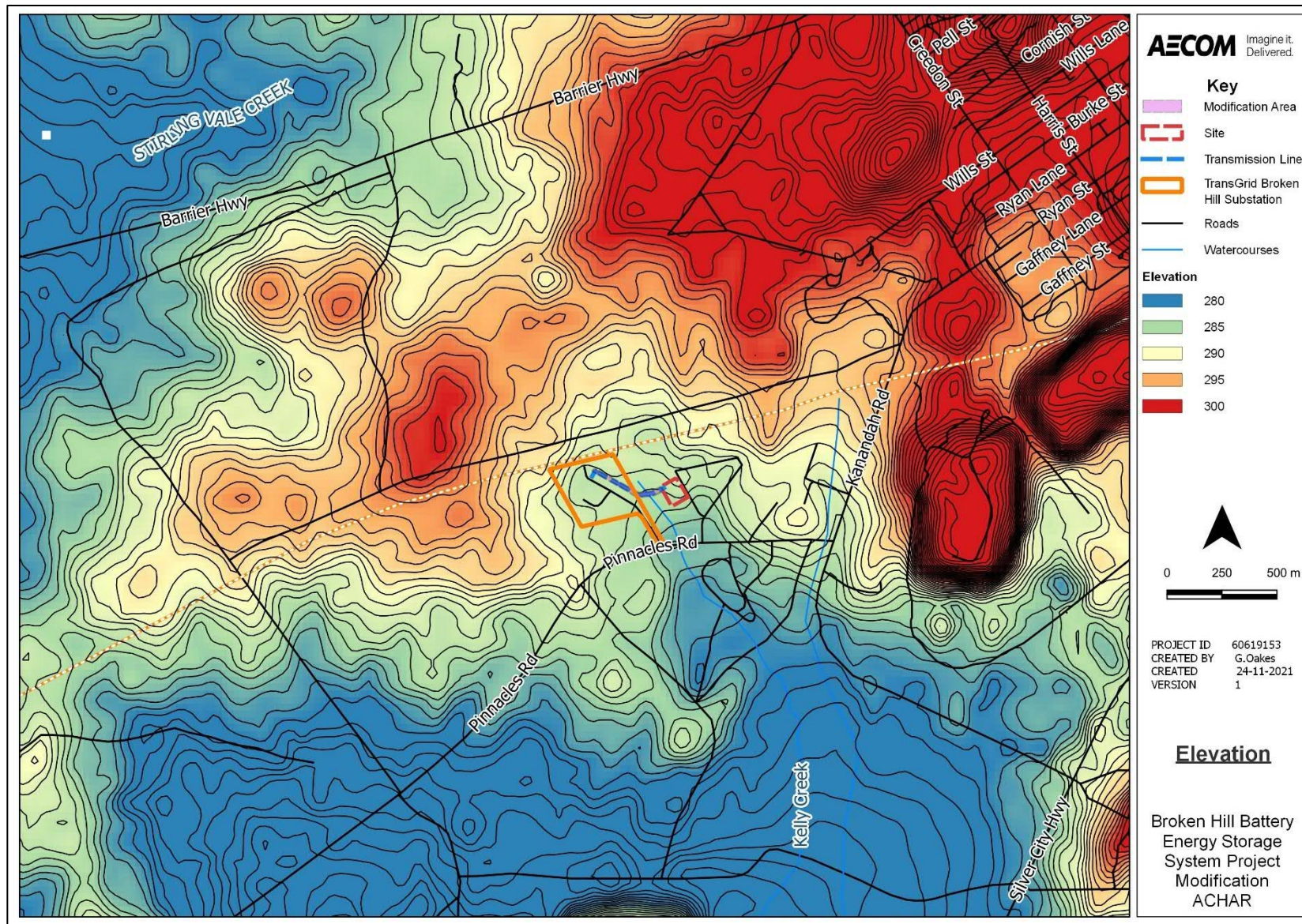
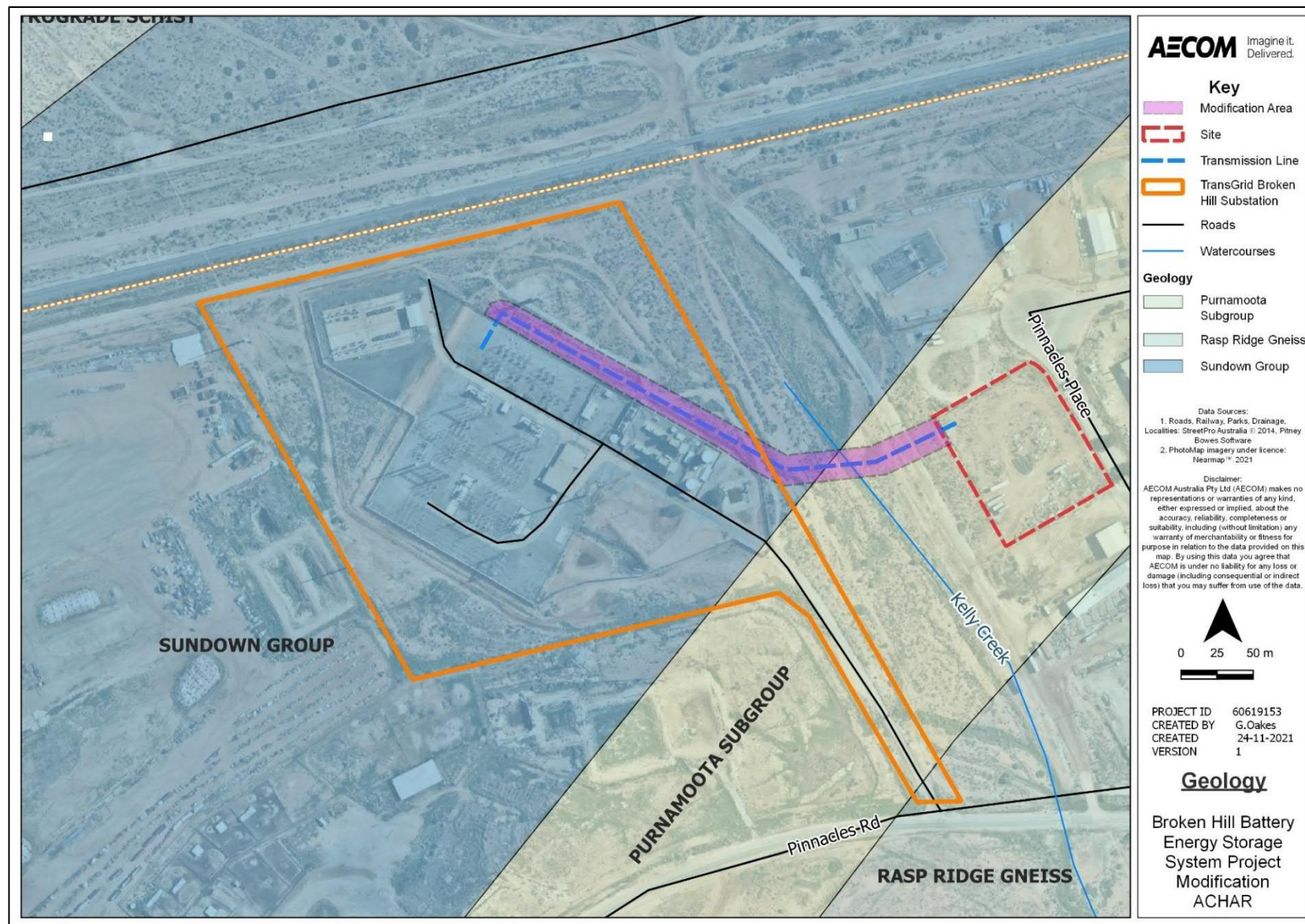


Figure 6 Geology



4.6 Flora and Fauna

Native vegetation within the Modification Area has been extensively modified as a result of Broken Hill's urban development with the majority cleared historically for industrial land uses. Reference to the historical aerials for the Modification Area indicates that it was fully cleared prior to 1982 (**Figure 8**). Vegetation across the Modification area, where remaining today, is generally degraded, lacking larger woody vegetation and tree species, and is dominated by low-lying native *Sclerolaena* (Copper-burr) and *Maireana* (Bluebush) species. In addition, weeds including *Lycium ferocissimum* (African Boxthorn) and *Prosopis velutina* (Velvet Mesquite) are present.

Sheep and cattle grazing, commencing in the region around the 1860s had a dramatic effect on the previously well-vegetated and stable soils of the region which by 1900 were in a seriously degraded condition. Grazing, rabbits, and the general clearing of native vegetation were the major contributing factors to the degradation, and when combined with naturally low rainfall, dry periods and hot summers the effect was dramatic (Ardill, 2017).

4.7 Historical Context and Land Use

Exploration of the northern portion of the Darling River commenced with an expedition by Charles Sturt in 1829 who ventured slightly west of the junction of the Bogan and Darling Rivers, some 500 km east of Broken Hill. Six years later, in 1835, Major Thomas Mitchell led an expedition that largely followed Sturt's route northwest from Sydney but pushing past Sturt, explored the Darling River around Menindee Lakes, 100 km south east of Broken Hill, almost to its junction with the Murray River. In 1844, Charles Sturt once again led an expedition into Australia's interior, leaving Adelaide and following the Murray River to its junction with the Darling River and exploring northward to Stephens Creek near Broken Hill and further north into the Barrier Ranges. Returning to Adelaide in 1846, news quickly spread of the lands along the Darling River resulting in squatters taking up various runs along the River Darling frontage that very year (Kearns, 1973:7).

In 1858, a prospecting party sponsored by the South Australian Government, left Adelaide intent to search for gold in the Barrier Ranges. After several months searching the region they failed to find any gold or other minerals. Over the next 17 years until 1875 the region developed largely as a pastoral area until two friends discovered silver while sinking a well at Thackaringa sheep station in the Barrier Ranges 40 km west of Broken Hill. This was the first recorded discovery of silver-bearing ore in the Barrier Ranges became the "Pioneer Mine". Shortly after in 1880, gold was discovered at Mount Browne and Mount Poole 200 km north of Broken Hill that triggered a small gold rush. The following year, in 1881, the Umberumberka claim was pegged out resulting in a small settlement being established that eventually became Silverton. At the same time, to the north of Silverton the small villages of Tibooburra, Milparinka and Mount Browne were created by prospectors hunting for gold in the Barrier Ranges (Kearns, 1973:11).

The Broken Hill area was known by early pastoralists as "the broken hill" because of the rocky outcrop that was visible rising above the plains. Nonetheless, the first mining lease wasn't pegged in Broken Hill until 1883 when 40 acres was pegged out Charles Rasp, David James and James Poole registered lease number 12. The three were joined by station manager George McCulloch and three other station workers to form the "Syndicate of Seven" registering the Broken Hill Propriety Company Ltd (BHP) in 1885. Five years later the Municipality of Broken Hill was incorporated with a population of 11,000 and a railway connected to the South Australian railway head at Cockburn. The first post office was opened in 1886, hospital in 1887 and theatre, church and police lockup in 1888. Since this time, Broken Hill has been the site of many major developments in mining and metallurgical technology, as well as important to the history of the union movement (Vines, 2011:6).

More specific to the Project Area, reference to Parish maps for Nadbuck indicates the lot occupied by the Transgrid Broken Hill Substation (Lot 2 DP1102040) was originally recorded as Crown reserve operated by the Electricity Commission of NSW and Lot 7302 DP1181129 was reserved for a roadway (now Commons).

Historical aerial photographs for the Project Area provide a framework for assessing the nature and extent of post-European settlement land use activities and associated ground disturbance across it.

Aerials from 1982 (**Figure 8**), 2004 (**Figure 9**), 2010 (**Figure 10**) and 2015 (**Figure 11**) indicate a range of activities and associated ground surface impacts. These include:

- Complete vegetation clearance across the entire Project Area prior to 1982
- Commencement of construction of the substation station at Lot 2 DP1102040 in 1982
- Grading for various access tracks in and around the Project Area prior to 1982
- Road constructed through the land classified as Commons (Lot 7302 DP1181129) prior to 2004
- Further grading within the land classified as Commons (Lot 7302 DP1181129) in 2015.

To varying degrees, all of the above-cited land use activities and associated ground impacts are relevant to the survival, integrity and identification of Aboriginal archaeological evidence within the Modification Area. Key implications for the current archaeological investigation include the disturbance of pre-existing archaeological deposits (if present), both surface and subsurface, through direct (e.g., grading) and indirect means, resulting in a loss of archaeological integrity and a significantly reduced likelihood for the presence of culturally scarred trees.

Figure 12 comprises a land disturbance map for the approved Project Area, with two basic levels of disturbance - 'low' and 'high' - recognised. Areas of 'low' disturbance within the Modification Area are defined as those that do not, on the basis of field observations and historical aerial photographs appear to have been subject to significant ground disturbance(s) (e.g., heavy earthworks). Highly disturbed areas, in contrast, comprise those that appear to have been severely disturbed through grading and heavy earthworks.

Figure 7 Part of undated plan of the Parish of Nadbuck Approximate location of approved Project Area marked in red
(Source: Land & Property Information NSW)



Figure 8 1982 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)



Figure 9 2004 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)



Figure 10 2010 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)



Figure 11 2015 aerial photograph of the Modification Area (Source: NSW Spatial Collaboration Portal)

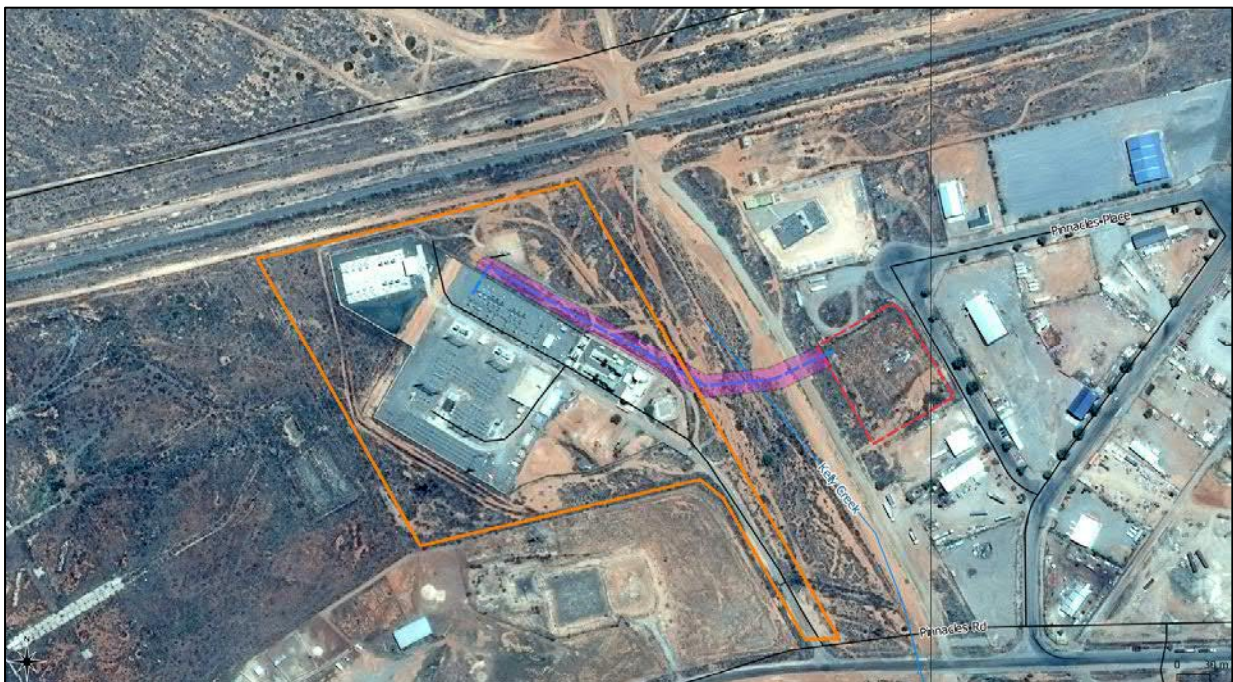
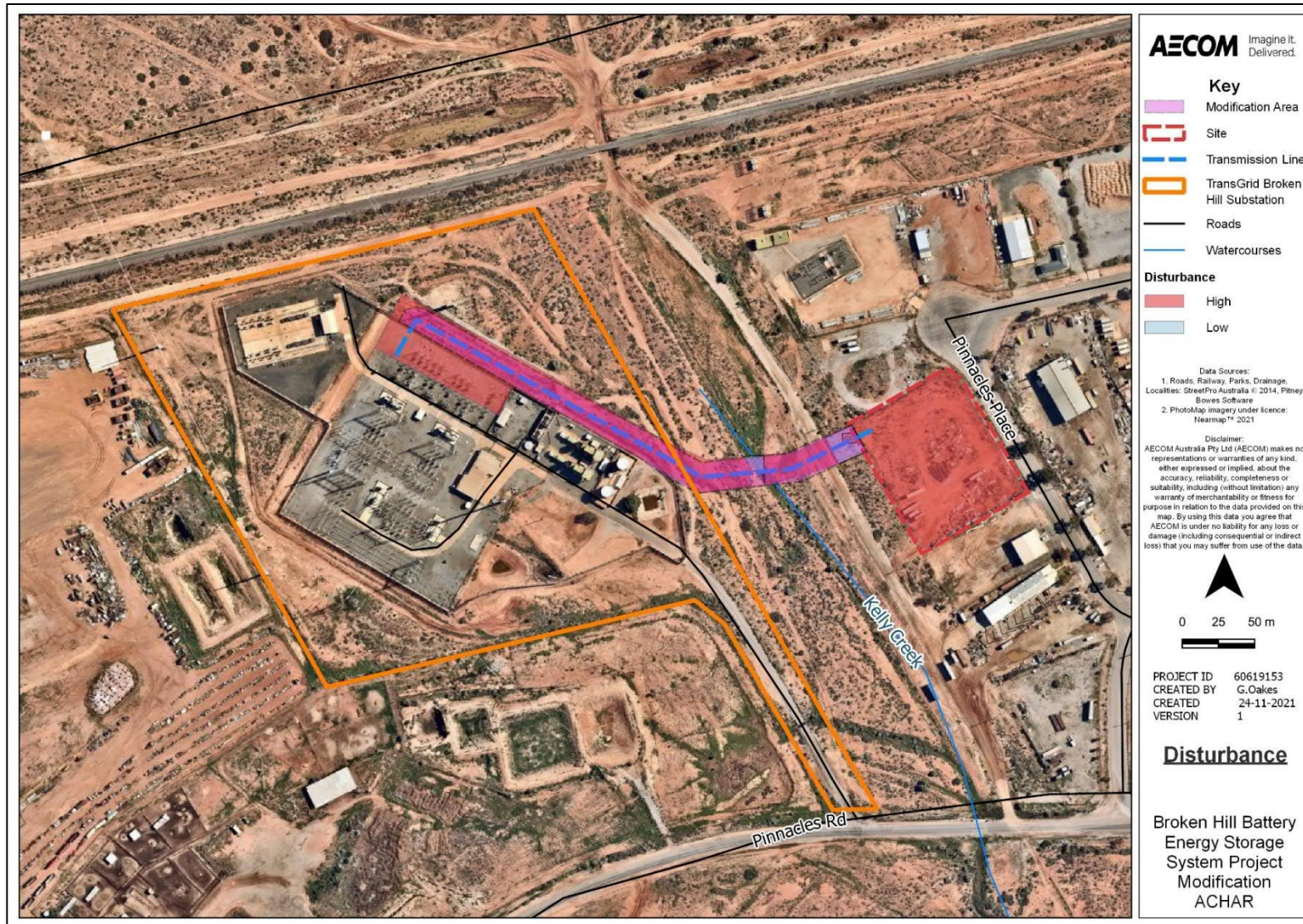


Figure 12 Disturbance



4.8 Key Observations

Key observations to be drawn from a review of the existing environment of the Modification Area are as follows:

- Mapped as occupying the lower slopes and outwash area of the southern Barrier Ranges, the topography of the Modification Area comprises an area of level to very gently inclined south facing slope that is barely perceptible “on the ground”
- One watercourse is located directly within the Modification Area - the upper portion of a 1st order ephemeral tributary of Kelly’s Creek, whose central channel is located 5.5 km south of the Modification Area. The channel of the ephemeral drainage line is barely perceptible on the ground and only holds water during rain and flood events
- Reference to the 1:100,000 Broken Hill Stratigraphy (Wills, 1989) map indicates the eastern half of the Modification Area falls within the Early Proterozoic antiquity Purnamoota (Bs) subgroup of the Willyama Supergroup (W) and western half falls within the Sundown Group (S). The Purnamoota subgroup is described as a metasediment sequence with two horizons comprising basic and garnet rich gneisses, as well as “lode horizon” rocks such as quartz and garnet. Rocks of the Sundown Group comprise well bedded non-graphitic metasediment with pelite-psammopelite units most abundant in the lower half and Psammite-psammopelite units more common in the upper half
- Field observations indicate that angular milky quartz gravels are present across the Modification Area. However, no outcrops of this material, worked or otherwise, were noted during the survey detailed in **Section 7**
- Quartz and/or silcrete gibber pavements similar to those noted in other parts of the greater Broken area region (e.g., Shiner, 2008) do not occur within or immediately surrounding the Modification Area
- Native vegetation within the Modification Area has been extensively modified as a result of Broken Hill’s urban development with the overwhelming majority cleared historically for industrial land uses
- Field observations and historical aerial photographs indicate that the Modification Area mostly comprises of highly disturbed land with negligible potential for *in-situ* Aboriginal objects to be present.

5.0 Ethnohistoric Context

5.1 Introduction

Information regarding the ways in which Aboriginal people likely used pre-contact landscapes is available to archaeologists through two primary sources: archaeological (i.e., survey and excavation) data and historical records. **Section 6.0** summarises the Aboriginal archaeological context of the Modification Area on both a regional and local scale. This section summarises relevant ethnohistoric information for the Modification Area. As in other parts of NSW and Australia more broadly, non-Aboriginal people occupying the Broken Hill area began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

5.2 Language Groups and Boundaries

Available sources, both primary and secondary, generally indicate that the Modification Area falls within the boundary of the Darling River language group, referred to as the Paakanty (Barkindji or Barkandji) language group, which comprised at least eight separate subgroups. One of these subgroups, the Wilyakali (or Wiljakali) people, is argued to have occupied the area surrounding Broken Hill. Paakanty is believed to have been spoken along the Darling River from Bourke to Wentworth, including areas around the Paroo River and Broken Hill. There were a number of local Paakanty dialects, including one spoken by the Wilyakali people, though while different, it is argued that they were similar enough to be understood by each other (Austin & Hercus, 2004). Tindale (1974) records the Wilyakali as occupying an area of approximately 28,000 km² from Olary (South Australia) in the west, south to Mutooroo, northeast to Mutawintji, and north into the Barrier Ranges (**Figure 13**). There is a suggestion by Tindale (1974) that the group retreated southward early in the 19th Century to avoid pressure to adopt traditions around circumcision being applied by the Ngadiuri people located to the northeast. For his part, Howitt (1904;49) speculates that the Wilyakali belonged to a supra-group he called the Itchumundi nation that incorporated four groups occupying the area around the Barrier Ranges called the Wilya, the Kongait, the Tongaranka and the Bulalli (**Figure 14**). However, this interpretation has not been widely accepted.

NEW SOUTH WALES.

Map showing the geographical features, major cities, and neighboring regions of New South Wales, Australia. The map includes latitude and longitude lines, with longitude ranging from 142 to 154 and latitude from 30 to 38. Key geographical features include the Macpherson Range, Clarence River, Port Macquarie, Port Stephens, Newcastle, Port Jackson, Sydney, Shoalhaven, Jervis Bay, and the Pacific Ocean. Major cities and towns marked include Wilcannia, Menindie, Wentworth, Euston, Albury, and Sydney. The map also shows the borders of Queensland, Victoria, and South Australia. The title 'NEW SOUTH WALES' is prominently displayed in the bottom right corner.

5.3 Social Organisation

Available historical records suggest that the primary units of social organisation amongst the Wilyakali were the clan and band. Although these terms are often used interchangeably (e.g., Kohen, 1993), following Attenbrow (2010), a distinction can be drawn between the two, with clans comprising local descent groups and bands, land-using groups who, though not necessarily all of the same clan, camped together and co-operated daily in hunting, fishing and gathering activities. Individual bands would have habitually occupied and exploited the resources of particular tracts of land within the overall territory of their clan. However, the territorial boundaries of each band would have been permeable or elastic in the sense of complex kinship ties facilitating inter-band territorial movements and the reciprocal use and/or exchange of resources.

The size of the individual groups or the general population of the Wilyakali/Paakanty occupying the region at contact is very hard to estimate and was no doubt activity and season dependent. Frederic Bonney (Bonney, 1883), one of the early European settlers in the Darling River area around Wilcannia, suggests that at contact, the Aboriginal population of the area would not “average more than about 100 on any 2,000 square miles”. Bonney (1883) goes on to argue that the environment in this part of NSW could not support a large population, being subjected to protracted droughts, during which food and water would have been scarce. During severe periods of drought, groups occupying the area would retreat to back country springs and major rivers where they would camp subsisting on animals who came to drink.

According to Howitt (1904), the Wilyakali, like many groups in southern central Australia, had the two-class (moiety) system whose class names are Kilpara and Mukwara, each of which has a group of totems. Children belong to the same class as their mother and when they are quite young are betrothed. Marriage was strongly forbidden within a class, and if it occurs, is considered unforgivable with the perpetrators shunned by their families but accepted between classes. Young men can marry their betrothed once they have completed the initiation ceremony (Bonney 1883:8).

5.4 Ceremony and Ritual

Evidence for ceremonial or ritual behaviour amongst the Aboriginal groups occupying the Darling River area at contact can be found in the accounts of a number of early observers (e.g., Bonney, 1883; Howitt, 1904), with documented ‘ceremonial’ activities including groups/clan gatherings, male initiation ceremonies, marriage, ritual combat and various burial, body adornment and modification practices. Although limited in number, references to spiritual beliefs of the Aboriginal groups occupying the region are also noted. However, many of these events were not directly witnessed by European observers but rather described by Aboriginal people who had participated in them or knew of them from their childhood.

Male initiation ceremonies in which Paakanty boys in the region became men are described by Bonney (1883). In this region, Bonney (1883) notes that the male initiation ceremony was referred to as when a youth is “made a young man of” and was a complex cultural practice involving boys of around 16 years of age. During the ceremony, the front tooth is removed (tooth avulsion) with the pointed end of a throwing stick. Alongside its use in the initiation ceremonies described above, body painting with animal fat and/or ochre was undertaken as part of gatherings and for the purposes of ritual combat. Amongst these groups body scarification and septum piercing were undertaken in ceremonies subsequent to that associated with initiation.

Available historical records suggest that burial in the earth was the most common form of burial practised by Aboriginal groups occupying the region. The body was buried immediately after death with the feet being tied together by the big toes and the hands tied by either the wrists, thumbs or little fingers. The body was wrapped in a rug and bound with a rope and the bundle tied on to a long stick called a *moolarie*. Two men would carry the body from the stick to the grave where it was covered in a low mound of earth with pieces of timber. There were no fixed burial grounds. Grave goods often consisted of items of personal gear such as a spear, hatchets and digging sticks (Bonney, 1883; Howitt, 1904).

Martin (1998:9) notes that the general Broken Hill area was a place of convergence for several important cultural stories, myths and pathways including the Bronzewing Pigeon; Eagle Hawk and Crow; Crow, Hawk and Duck; and Kuluwirru stories. These stories, and oral accounts suggest that large

gatherings of people from western NSW, southwest QLD and the Flinders Ranges came together in the Broken Hill area for ceremonies, exchange and other social interaction (Martin 1998).

5.5 Post-Contact History

As in other parts of NSW and Australia more generally, the early post-contact history of Aboriginal people in western NSW is primarily one of dispossession and loss, with traditional hunting and camping grounds rapidly claimed and settled by Europeans and populations significantly reduced by introduced diseases (Bonney, 1883; Bride, 1898; Clark, 1990; Howitt, 1904; Morrison, 1965). Bonney (1883:2) records one such event where in around 1850, an epidemic struck the Paakanty, killing a third of the population of the group.

The introduction of European diseases had a devastating impact on the Aboriginal population, with diseases such as whooping cough, typhoid, influenza, bronchitis, tuberculosis, small-pox, pneumonia and even the common cold causing or contributing to the deaths of large numbers of Aboriginal people (Bride, 1898; Shaw, 1998). The loss of traditional hunting grounds, a decline in the abundance of game that populated these areas and historical impacts on the waterways (i.e., mining and pastoral activities), have also been identified as factors relevant to the marked population decline that accompanied the European settlement of the region. Aboriginal people were often employed at local stations for their skills in bark cutting to build huts as well as hunting and gathering (Bonney, 1883).

After being displaced from their country, Aboriginal people have since returned to country and retained strong cultural connections to the land. Today, the Wilyakali people are actively involved in the protection and promotion of their culture for future generations.

6.0 Archaeological Context

6.1 Regional Context

As highlighted by Shiner (2008) and others (e.g., Holdaway & Fanning, 2014; Holdaway et al., 2000; Witter, 2004), the Aboriginal archaeological record of the semi-arid rangelands of far western NSW is dominated by extensive *surface* distributions of stone artefacts and heat retainer hearths. These features occur in a range of landscape contexts but are particularly prevalent on eroded land surfaces adjacent to creeks, drainage lines and swamps. Holdaway et al. (2014) in particular has noted that the stone artefact record of semi-arid “*most often comprises surface deposits of stone artefacts commonly, but not always, associated with other archaeological remains...*”. These sites usually represent multiple behavioural events, aggregated into a single surface expressions. Fanning (2002) argues that primary cause for stone artefacts to be present in surface contexts is due to erosion which has been accelerated by land use change related to European grazing activities. However, subsurface materials do occur in semi-arid landscapes, but only when the depositional environment favours deposition, such as on channel margins on valley floors (Holdaway et al., 1997).

Levels of archaeological visibility in these and other rangeland settings are typically high, a product of naturally discontinuous vegetation regimes and accelerated levels of erosion triggered by the introduction of European pastoralism in the mid-19th century (Fanning, 1999; Fanning & Holdaway, 2004; Fanning et al., 2009). Geoarchaeological research carried out at various locations across the rangelands, undertaken as part of the Western New South Wales Archaeological Program (WNSWAP), has demonstrated that the surface archaeological record of this region is both spatially and temporally discontinuous, with the preservation, exposure and visibility of surface artefact and hearth deposits controlled by geomorphic processes operating on highly variable time and spatial scales, from hours to millennia and tens to many thousands of m² (e.g., Fanning, 2002; Fanning et al., 2008; Shiner, 2008; Fanning et al., 2009). Here, as in several other arid to semi-arid regions of Australia, surface distributions of stone artefacts and heat retainer hearths typically lack clear, readily definable boundaries, as well as stratigraphy in the conventional sense. Accordingly, it has been argued that these deposits are best conceived of as ‘cumulative’ or ‘time-averaged’ palimpsests (*sensu* Bailey, 2007 and Stern, 1994 respectively) (see, in particular, Holdaway et al., 2008; Shiner, 2008, 2009).

Discontinuous mid-to-late Holocene (~7000 BP to present day) chronologies for the semi-arid rangelands of western NSW, established via radiocarbon determinations on charcoal from hearths and OSL determinations for the land surfaces on which the archaeological deposits rest, attest to both a dynamic record of past Aboriginal occupation across this region, as well as complex histories of landscape change (e.g., Fanning & Holdaway, 2001; Fanning et al., 2008; Holdaway et al., 2005; Shiner, 2008). This dynamism is also reflected in the stone artefact assemblages of the region, with technological analyses of rangeland assemblages demonstrating considerable complexity in the organization of Aboriginal lithic technology, and providing further support for variable long-term occupation histories (e.g., Douglass & Holdaway, 2011; Douglass et al., 2016; Holdaway et al., 2014; Holdaway et al., 2008; Shiner, 2008; Shiner et al., 2005). Quartz and/or silcrete dominant, flaked stone assemblages from the rangelands indicate a “simple” flake and core technology geared towards the provisioning of individuals (*sensu* Kuhn, 1994) under conditions of high mobility, with regionally high stone abundance ostensibly removing the need for large numbers of formal tools, extended artefact maintenance and intensive core preparation.

Recent approaches to the analysis and interpretation of deflated surface deposits of stone artefacts across western NSW, including the semi-arid rangelands, have advocated a perspective rooted in the concepts of persistent place use (after Schlanger, 1992) and artefact accumulation as a time dependent process (Holdaway et al., 2008, 2004; Shiner, 2006, 2008, 2009; Shiner et al., 2005). Schlanger (1992) introduced the term “persistent place” to describe specific areas of landscape that witnessed repeated human activity over the long term occupation of a region. Persistent places, as articulated by Schlanger (1992), are created through two basic mechanisms, the first being when a particular landscape segment possesses a quality that attracts repeated human activity over time, for example, a watercourse or knappable stone source, the second, being the structuring of future landscape use through human creations and/or environmental modifications. Such places may be functionally dynamic through time and need not attract permanent settlement, the alternative being long-term episodic use (Shiner, 2009:26). Viewed from this perspective, the composition and spatial characteristics of flaked stone

artefact assemblages reflect the long-term repeated use of locations and, as such, are beyond ethnographic-scale reconstructions (Shiner, 2008:11; 2009:26).

Investigating the temporal character of assemblage accumulation requires that consideration be given to the life histories of individual artefacts; specifically, their probability of discard. Flaked stone artefact assemblages contain both 'expedient' and 'formal' (or 'curated') tools, with the latter representing a greater investment of time and energy (Andrefsky, 1994). Compared to their expedient counterparts, formal tools are more likely to be transported between multiple locations before being discarded. Accordingly, assemblages with large numbers of formal tools "are indicative of intensively occupied persistent places" (Shiner, 2008: 11). Differences in the intensity of raw material utilisation can likewise serve as a relative measure of occupation intensity because extended occupation can lead to a more intensive reduction of raw materials (Dibble & Rolland, 1992; Dibble, 1995; Elston, 1990). As Shiner (2008:34), with reference to Dibble et al. (1995:267), has observed, "assemblages that reflect more intensive reduction of raw materials will exhibit high flake to core ratios, a low proportion of cortical artefacts, a decrease in debitage size and heavily worked tools and cores". Measures of the intensity of reduction can be compared between locations to investigate differential place use, with intensively utilised locations characterised by large numbers of formal tools and intensively utilised raw materials.

A useful example of the application of these principles to the surface archaeological record of the rangelands is provided by Shiner (2006, 2008, 2009), who analysed flaked stone assemblages from four separate sampling areas on Pine Point and Langwell Stations, two adjoining pastoral leases located approximately 50 km south of Broken Hill, on the southern periphery of the Barrier Ranges. Occupational chronologies for the two alluvial systems associated with these assemblages were constructed through a Bayesian analysis of 16 radiocarbon determinations from heat retainer hearths, which indicated five main phases of hearth construction between c.2,000 cal BP and 550 to 350 cal BP. Shiner compared levels of reduction intensity between these locations, as well as patterns of raw material use, ultimately revealing both consistencies and inconsistencies in the reduction and utilisation of lithic raw materials. While some aspects of the Pine Point-Langwell assemblages were argued to reflect raw material availability, with, for example, silcrete distance-decay relationships evident, others were interpreted as a product of unique occupational histories, with no single location occupied in the same manner throughout the duration of assemblage accumulation. For Shiner, Aboriginal peoples' use of the Pine Point-Langwell landscape has resulted in "multi-layered temporal landscape of human occupation", with archaeological record of this landscape documenting not one but multiple settlement systems and thus not amenable to synchronic settlement pattern models.

6.2 Local Archaeological Context

6.2.1 AHIMS Database Search Results

The AHIMS database, administered by Heritage NSW, contains records of all Aboriginal objects reported to the Chief Executive of the Office of Environment and Heritage in accordance with Section 90Q of the NPW Act. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database undertaken on 25 November 2021 for a 10 x 10 km area centred on the Modification Area, extending 5 km to the north, south, east and west, resulted in the identification of 51 Aboriginal sites, comprising 41 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site (**Figure 15, Table 2**).

Consideration of the location of previously recorded Aboriginal sites indicates that no previously recorded Aboriginal sites are located wholly or partially within the Modification Area. The closest site – open artefact site "Kanandah 1" (AHIMS #23-4-0640) is located around 390 m to the south of the Modification Area.

Table 2 Site search results (10 x 10 km area)

Site Type	Count	% site type
Open artefact site (i.e., isolated artefacts and artefact scatters)	41	80
Stone quarry	7	14
Hearths	2	4
Resource and gathering site	1	2
Total	51	100

6.3 Previous Archaeological Investigations within the Broken Hill Area

Existing AHIMS data indicate that a number of Aboriginal archaeological investigations have been undertaken within the Broken Hill area over the last three decades. These include archaeological surveys by Central West Archaeological and Heritage Services (1996), Dibden (2008), Gay (2001), Martin (1989, 1998), OzArk Environmental & Heritage Management (2013) OzArk Environmental & Heritage (2014) and Time Capsule Earth (2007) and a test excavation by (Niche Environment and Heritage Pty Ltd, 2017). Summaries of these assessments are provided below.

In 1989, Sarah Martin completed an archaeological survey of a section of Gairdners Creek where a concrete causeway was to be constructed. One open artefact site was identified that was partly impacted by construction of the exiting road. The identified assemblage was dominated by quartz (66%) with smaller quantities of “exotic” materials including silcrete/chert (20%) and quartzite (14%). Recorded types included cores, retouched flakes and complete flakes, as well as debitage items.

In 1996, Central West Archaeological and Heritage Services completed an archaeological survey for a proposed bridge replacement over Thackaringa Creek, 44 km west of Broken Hill on the Barrier Highway. One open artefact site was identified comprising an extensive artefact scatter of thousands of artefacts distributed over an area of approximately 800 m along the banks of Thackaringa Creek. It was suggested that due to the high artefact numbers and density that Thackaringa Creek formed a focal point for Aboriginal people in the region. Identified artefacts consisted of almost exclusively quartz but also small numbers of silcrete artefacts. At least one knapping floor was noted. Artefact types included flakes, cores, and associated debitage, as well as millstones. No hearths or ovens were identified.

In 1998, Sarah Martin completed an archaeological survey of the Pinnacles located west of Broken Hill. The survey was completed to support an anthropological assessment completed for the area that highlighted the Pinnacles as important cultural place for Aboriginal people forming a key part of the Bronzewing Pigeon Story. A total of 11 Aboriginal sites comprising open artefact scatters and quarries were recorded in and around the Pinnacles with one site alone estimated to contain around 300,000 artefacts. Ovens were also associated with a number of the sites. Artefacts comprised cores, flakes and flake debitage, blades, a variety of tools, grinding dishes, mortars. The majority of artefact were manufactured from quartz. The sites were concentrated in two main areas, along Pine Creek and Stirling Vale Creek.

In 2001, Louise Gay completed an archaeological survey for the construction of a mineral separation plant on the south-west outskirts of Broken Hill. A total of 16 Aboriginal sites comprising eight quartz quarry sites and eight open artefact sites were identified. Quartz quarry sites comprised outcrops or reefs of quartz where some evidence of use was identified. An average of 10 to 25 artefacts were recorded at most of the sites with the exception of quartz quarries AS3 and AS16 which showed a higher intensity of quarrying with 50-100 artefacts noted. All sites comprised quartz artefacts with only one artefact of silcrete identified. Types included flakes, cores, core tools, flake tools and flake debitage. All of the open artefact scatter sites were located adjacent to watercourses with one featuring an exposed “oven”. Gay suggested that based on their contents the sites represent short-term transit camps associated with the extraction of stone material from the quartz outcrops and/or travel between the Broken Hill area and the Pinnacles to the southwest.

In 2007, Time Capsule Earth completed an archaeological survey of two areas proposed for quarrying located approximately 20-30 kms southwest of Broken Hill. A total of 18 Aboriginal sites were recorded during the survey comprising 16 open artefact sites and two hearths/ovens. The majority of artefacts

were manufactured from quartz with small numbers of silcrete and unidentifiable local materials also present. Artefact types included flakes, cores, retouched tools, hammerstones and a grinding set (dish and bowl).

In 2008, Dibden was engaged to complete an Aboriginal and historic heritage assessment for a proposed wind farm located in Silverton, 20 km northwest of Broken Hill. Archaeological survey completed across the project area resulted in the identification of 262 Aboriginal sites (or locales the term Dibden uses). The majority of sites comprised of distributions of predominately quartz artefacts (n = 166) with quartz outcrops with evidence of exploitation SPA's also present (n = 78). In addition, 14 stone artefact sites with heat retaining hearths, three isolated artefacts and one stone arrangement was identified. Sites generally comprised very low to low density quartz artefact distributions on elevated landforms. Alongside quartz, other artefact raw materials included chert, silcrete, quartzite and various other volcanics. Artefact types included flakes and flake debitage items, cores, scrapers, Bondi points, adzes. Non-flaked artefacts recorded included mortars and hammerstones. Several slabs of schist were recorded as possible grinding slabs. The majority of sites were located on crests (n = 221), followed by simple slopes (n = 33), open depressions (n = 6), ridges (n = 1) and flats (n = 1). Dibden (2008) suggests that the site patterning results are largely driven by the nature of the project area – that is, the majority of land surveyed comprises crests and elevated terrain suitable for the placement of wind turbines.

In 2013, Ozark Environmental & Heritage completed an archaeological survey for the expansion of a hard rock quarry in Broken Hill. A total of four Aboriginal sites were recorded comprising three open artefact sites and one quartz quarry. The three open artefact sites were located on lower slopes while the quarry was located on a middle to upper slope. Artefacts were manufactured from both quartz and quartzite with the exception of an axe/adze manufactured from an unknown volcanic material. Artefact types included flakes and flake debitage.

In 2014, Ozark Environmental & Heritage was engaged to complete an Aboriginal heritage assessment for a proposed 200 ha solar farm located approximately 5 km west of Broken Hill city with a 22 kV transmission line running into the Broken Hill substation. Archaeological survey completed for the project resulted in the identification of 14 Aboriginal sites consisting of 11 isolated artefact sites and three open artefact scatters. The majority of sites were identified within areas defined by Ozark Environmental & Heritage (2014) as “bare alluvial fan washout areas associated with the narrowly incised ephemeral drainage channels”. Artefact raw material types included silcrete, chert and quartz, with silcrete the dominant material. Artefact types included flake and flake debitage items, cores, and retouched flakes. Ozark Environmental & Heritage (2014) concluded that the distribution of sites across the project area and their clustering around ephemeral drainage channels was a product of both a lack of available water locally as well as geomorphic processes exposing artefacts in these contexts.

In 2017, Niche completed a program of archaeological test excavation in the Broken Hill area, between Broken Hill and Pine Creek, including along Stephens Creek. The program of test excavation found that soils within tested landforms rarely exceeded 300 mm in depth, with no deep A horizon soil profiles encountered. Furthermore, no Aboriginal objects were recovered from below 50 mm (i.e., 5 cm). Soils were found to often be windblown, disturbed and reworked, supporting the interpretation that most surface finds were lag deposits and the integrity of any subsurface Aboriginal objects present in this landscape is likely to be poor. A total of 17 stone artefacts were recovered from six test pits during the program of test excavation with 5 being the highest number of artefacts in a test pit. Artefacts were generally recovered from the upper layers of test pits. The majority of artefacts were manufactured from quartz (82%), followed by silcrete (18%). Radiocarbon dates obtained from charcoal samples at two hearths returned dates of 1361 ± 65 BP (89 AD $\pm$ 65 AD) and 1596 ± 16 BP (384 $\pm$ 16 AD). Most sites, artefacts and hearths were located within 600 m of water. Where sites were located further away, they tended to be associated with raw materials sources.

In early 2021, AECOM completed an ACHAR for the approved Project that was used to support the Environmental Impact Statement (EIS). As part of the assessment, a field team of two AECOM heritage specialists and Registered Aboriginal Parties (RAPs) representatives completed the archaeological survey within the Site and transmission line corridor on Wednesday 20 January 2021. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey. RAPs identified two lithic items they considered might potentially be artefacts. While neither item satisfied technical criteria for identification as a stone artefact, as a precautionary measure, both

items were moved outside of areas of potential ground surface disturbance by the attending RAP field representatives. The report was finalised and used to support the EIS to obtain development consent.

6.4 Archaeological Predictions

A review of the existing archaeological and environmental context of the Modification Area suggests that material evidence of past Aboriginal activity within the area is likely to be restricted to flaked stone artefacts and/or heat retainer hearths in surface contexts. Accordingly, key predictions for the Modification Area's Aboriginal archaeological record are as follows:

- Considering the extent of past disturbances, identified stone artefacts encountered within the Modification Area would likely be in disturbed contexts and not *in-situ*
- If present, stone artefacts would most often comprise surface distributions and might be associated with other archaeological remains, including heat retaining hearths
- Stone artefacts are most likely to be identified on eroded land surfaces adjacent to creeks, including ephemeral drainage lines, where levels of visibility are typically higher
- If present, Aboriginal archaeological materials within the Project Area will be of mid-to-late Holocene antiquity (~7000 BP to the present day)
- The dominant raw material for flaked stone artefact production within the Modification Area will be quartz, with silcrete the second most common material
- Flaked stone objects will be dominated by flake debitage items (*sensu* Andrefsky, 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented
- Formal retouched tool types will be poorly represented in stone artefact assemblages.

Figure 15 AHIMS sites

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7.0 Archaeological Survey and Test Excavation

7.1 Archaeological Survey

7.1.1 Aim and Objectives

The aim of the archaeological survey was to identify, record and map Aboriginal heritage values within the Modification Area. These values include both the tangible evidence of past Aboriginal activity (i.e., archaeological evidence) as well as intangible cultural values. To achieve these aims, the following specific survey objectives were developed:

- To comprehensively survey, by pedestrian transects, land within the Modification Area
- To identify and record Aboriginal archaeological objects within the Modification Area
- To provide data that will assist with the development of an appropriate management strategy for the known and potential Aboriginal archaeological values of the Modification Area.

7.1.2 Methodology

A field team of three AECOM heritage specialists and RAP representatives completed the archaeological survey across the Modification Area on Wednesday 18 November 2021 (**Table 3**). All of the survey was conducted on foot, with a single transect executed along the transmission line easement. Participants in the survey were spaced roughly at 5 m intervals during the survey.

Table 3 Survey field team

Organisation	Representative	Position	Date
AECOM	Geordie Oakes	Archaeologist	18-Nov-21
AECOM	Andrew McLaren	Archaeologist	18-Nov-21
AECOM	Rebecca Hibberd	Archaeologist	18-Nov-21
Wilyakali Aboriginal Corporation	Dulcie O'Donnell	Site officer	18-Nov-21
Wilyakali Aboriginal Corporation	Bernie O'Donnell	Site officer	18-Nov-21
BHLALC	Ricky Mann	Site officer	18-Nov-21
BHLALC	Regan O'Donnell	Site officer	18-Nov-21
Barkanndji #8 Native Title Determinants	Christopher Quayle	Site officer	18-Nov-21
Barkanndji #8 Native Title Determinants	Talan Brown	Trainee site officer	18-Nov-21
Barkanndji #8 Native Title Determinants	Bailey Love	Trainee site officer	18-Nov-21

7.1.3 Results

7.1.3.1 Survey Coverage

As indicated in **Section 7.1.2** and shown on **Figure 16**, a single 340 m long pedestrian transect was completed over the Modification Area. The effective coverage estimate for the completed transect, shown in **Table 4**, was excellent, exceeding 70%. Ground Surface Visibility (GSV) across the Modification Area was also generally very good, due to a general lack of vegetation cover. Calculation of the total effective coverage achieved for the survey indicates that around 72% of the Modification Area's ground surface could be effectively surveyed for surface Aboriginal archaeological materials.

During the archaeological survey, it was noted that much of the Modification Area had undergone significant historical disturbances. In particular, land directly adjacent to the Transgrid Broken Hill

substation palisade was identified as highly disturbed due to the original construction of the substation, as well as the installation of multiple underground utilities (**Plate 3**). RAPs present during the survey likewise agreed that much of the land within the Modification Area had been subject to significant historic disturbances.

Table 4 Effective coverage data for the survey

Survey Unit	Landform Unit	Survey Unit Area (ha)	Visibility %	Exposure %	Effective coverage (ha)	Effective coverage %
Transect 1	Level/gently inclined slope	0.68	0.9	0.8	0.4896	72



Plate 2 View east showing ground surface visibility within the Project Area (source: AECOM 2021)



Plate 3 View northwest showing disturbance adjacent to the Transgrid substation (source: AECOM 2021)

7.1.3.2 Surface Artefacts

A total of 11 Aboriginal artefacts were identified during the archaeological survey. The artefacts were recorded scattered over an area roughly 5 m x 2 m in size and are considered to comprise a single artefact scatter site designated - BESS-AS1-21 (23-4-0691).

A simplified typological breakdown of the recorded assemblage (**Table 5**) shows that it is dominated by flake debitage (i.e., complete flakes and flake shatter) (n=9; 54.6%). Non-flake debitage items account for 27.3% of the assemblage (n=3). Formed objects (i.e., cores or tools) make up the remainder of the assemblage and include one core and one retouched flake (scraper). Quartz was the dominant raw material recovered, accounting for 90.9% (n=10) of the assemblage with the remaining artefact manufactured from silcrete. Recovered artefacts are generally large, with an average maximum linear dimension of 28.9 ± 2.7 mm (range: 15.1-43 mm) (**Appendix C**).

Table 5 Simplified typological breakdown of surface artefacts

Type	Quartz	Silcrete	Total (n)	% Total (lithics)
Complete flake	5	-	5	45.5
Flake shatter	1	-	1	9.1
Angular shatter	3	-	3	27.3
Core	1	-	1	9.1
Retouched flake	-	1	1	9.1
Total artefacts (n)	10	1	11	-

Type	Quartz	Silcrete	Total (n)	% Total (lithics)
% Total artefacts (n)	90.9	9.1	100	-

In addition to the above artefacts, the two lithic items RAPs identified during the archaeological survey for the broader EIS ACHAR that they considered might potentially be artefacts were located and moved to within the identified artefact scatter to simplify their future management (AECOM, 2021).

Figure 16 Archaeological survey and surface artefacts

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7.2 Archaeological Test Excavation

7.2.1 Purpose, Sampling Strategy & Methods

At the request of RAPs, a two day program of archaeological test excavation was completed across the Modification Area on 17 and 18 November 2021. In accordance with Requirement 3.1 of the Code of Practice, the overarching objective of the test excavation program was to collect information about the nature and extent of any subsurface archaeological deposits within the Modification Area, if present. A notification was provided to Heritage NSW for the proposed testing program on 15 October 2021 (**Appendix D**).

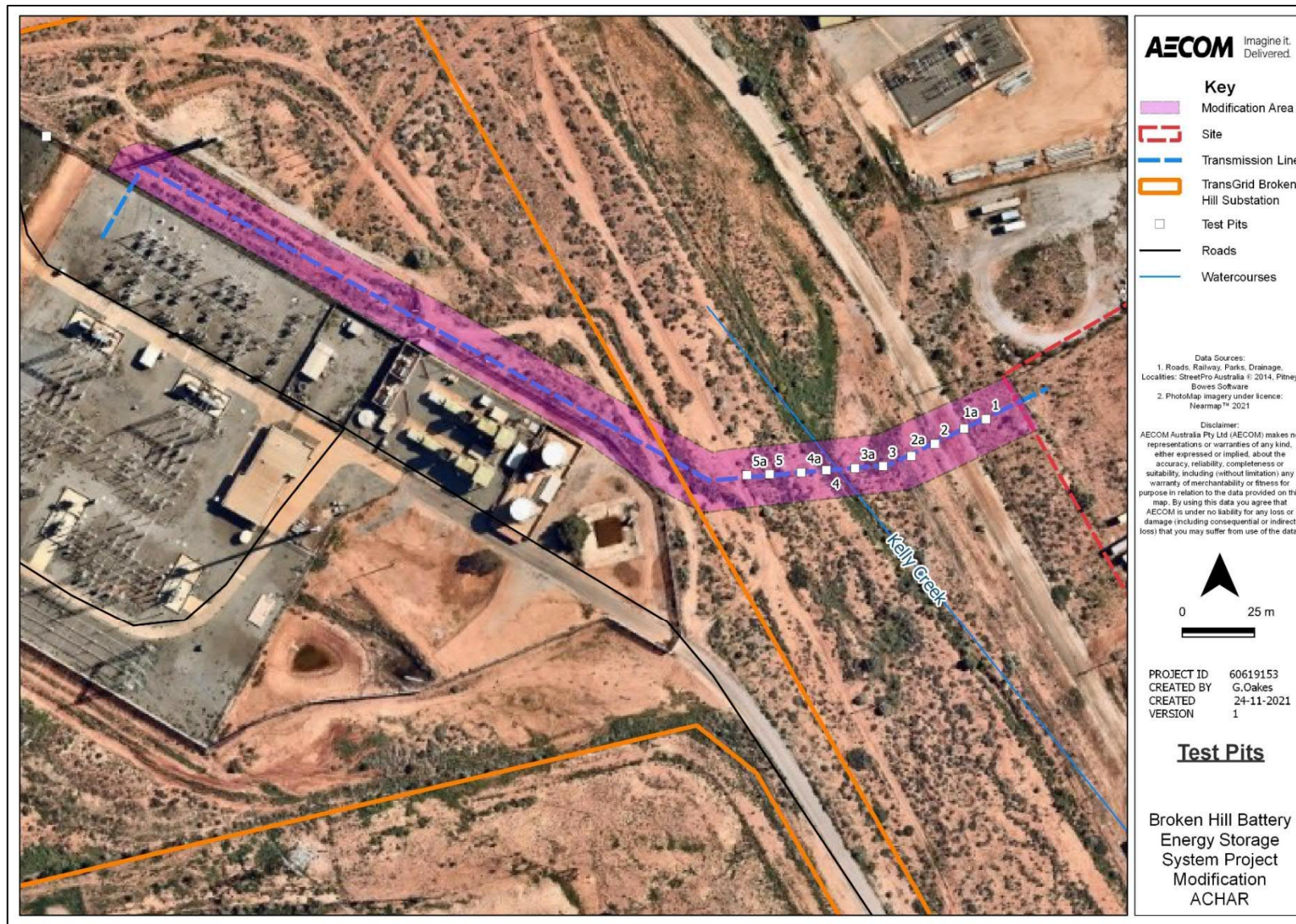
Archaeological test excavation was undertaken in a single phase with 10 x 0.25 m² test pits excavated at 10 m intervals along the transmission line easement. Originally, 17 test pits were proposed at 20 m intervals along the transmission line corridor, however during the archaeological survey significant ground surface disturbances were noted directly adjacent to Transgrid Broken Hill substation. The presence of underground utilities in this area made excavation impractical due to safety concerns. As such, after a discussion with RAP site officers it was agreed to remove these pits from the program and focus test excavations on undisturbed portions of the Modification Area.

In accordance with the Code of Practice, all test pits were hand excavated as 50 x 50 cm units, with 5 cm spits employed during the excavation of the test pit (TP 1) and 10 cm spits thereafter. In accordance with the Code of Practice Requirement 16a (point 8) all excavated sediment was sieved through a 5 mm aperture wire-mesh sieve. Due to the loose sandy nature of the soils, dry sieving was deemed appropriate for the program of test excavation. All definite and potential cultural lithic items were collected at the sieves and bagged by square and spit.

Requirement 16a (9) of the Code of Practice states that test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units and must continue to confirm the soils below are culturally sterile. While no test pits contained artefacts, all test pits were excavated to the base of the A horizon soils and partially into the subsoils in order to define the subsoils and test for sterility. Representative profiles in all test pits were drawn and/or photographed, with test pit stratigraphy recorded on pro forma test pit recording sheets using standard sedimentological terms and criteria (after McDonald & Isbell 2009).

The locations of excavated test pits are shown on **Figure 17**. Detail on the locations, contents and stratigraphy of all test pits is provided in **Appendix E**.

Figure 17 Test pit locations



7.2.2 Findings

No subsurface artefacts were recovered as part of the excavation program.

As indicated in **Section 4.5**, soils across the foot slopes of the Barrier Ranges, which includes the Modification Area have been characterised as weakly banded, red texture contrast soils with slight expressions of surface quartz. Field observations of soils encountered during the test excavation program were consistent with this characterisation, generally comprising shallow red/brown sandy loams overlying red/brown clay B horizons clays. A typical soil profile is shown on **Plate 4** and **Plate 5** while associated laboratory results for TP03 are provided in **Table 6**.

As shown in **Table 7**, the thickness of A horizon soils across the Modification Area varied with test pits excavated closer to the drainage channel featuring the deepest A horizon soils (i.e., TP04 and TP04a (36 cm)). The shallowest soils were encountered near the access track (TP01a, 4 cm) and underground utilities (TP05 and TP05a, 1cm and 5 cm, respectively). These soil profiles were assessed in the field as highly disturbed with much of their upper profiles missing.

Evidence of bioturbation, in the form of roots, was observed throughout sampled A soil horizons. Gravels were present in all the excavated test pits and where encountered, comprised fine (2-6 mm) subrounded pebbles and occasional coarse chunks of gypsum and exotic materials.

Table 6 Laboratory analysis results for soil samples

Sample Code	Soil Horizon	Depth	Clay (< 2µm)	Silt (2-60 µm)	Sand (0.06-2 mm)	Gravel (>2mm)	Int. Texture Class
TP03-A Horizon	A	10 cm	11%	14%	74%	3%	Sandy loam
TP03-B Horizon	B	20 cm	47%	19%	32%	2%	Clay

Table 7 Descriptive statistics for excavated 'A' soil horizons

Landform	N	Mean depth (cm)	StdDev	Min (cm)	Max (cm)
Flat/very gently inclined slope	10	14.7	3.9	1	36



Plate 4 Typical soil profile (TP03) (Source: AECOM 2021)



Plate 5 Typical soil profile (TP04) (source: AECOM 2021)

7.3 Aboriginal Sites

On the basis of the survey and test excavation works undertaken, a single Aboriginal site, comprising a surface artefact scatter, is recognised within the Modification Area (BESS-AS1-21). Site details are provided in **Table 8** below and its location shown on **Figure 18**.

Table 8 BESS-AS1-21 (23-4-0691)

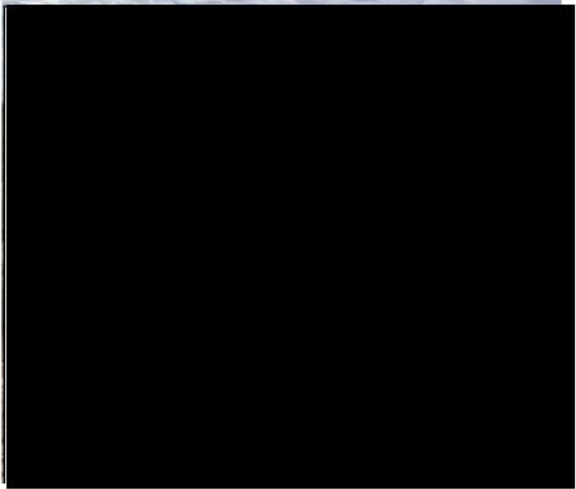
Site Name: [REDACTED] Site type: Artefact scatter Co-ordinates (centroid): [REDACTED] Landform: Flat Distance to creekline: 50 m Dimensions: 5 x 2 m Artefacts: 11 PAD: None Condition: Disturbed by installation of underground utilities Scientific significance: Low	
	
	Plate 7 Retouched silcrete flake

Figure 18 Aboriginal sites
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8.0 Significance Assessment

8.1 Principles of Assessment

Heritage sites hold value for different communities in a variety of different ways. All sites are not equally significant and thus not equally worthy of conservation and management (Pearson & Sullivan 1995: 17). One of the primary responsibilities of cultural heritage practitioners, therefore, is to determine which sites are worthy of preservation and management (and why) and, conversely, which are not (and why) (Smith & Burke 2007: 227). This process is known as *the assessment of cultural significance* and, as highlighted by Pearson and Sullivan (1995: 127), incorporates two interrelated and interdependent components. The first involves identifying, through documentary, physical or oral evidence, the elements that make a heritage site significant, as well as the type(s) of significance it manifests. The second involves determining the degree of value that the site holds for society (i.e., its cultural significance) (Pearson & Sullivan 1995: 126).

In Australia, the primary guide to the assessment of cultural significance is the *Australian ICOMOS Charter for Places of Cultural Significance* (2013), informally known as *The Burra Charter*, which defines cultural significance as the “aesthetic, historic, scientific, social or spiritual value for past, present or future generations” of a site or place (ICOMOS 2013: 2). Under the Burra Charter model, the cultural significance of a heritage site or place is assessed in terms of its aesthetic, historic, scientific and social values, none of which are mutually exclusive (Table 9). Establishing cultural significance under the Burra Charter model involves assessing all information relevant to an understanding of the site and its fabric (i.e., its *physical* make-up). The assessment of cultural significance and the preparation of a statement of cultural significance are critical prerequisites to making decisions about the management of any heritage site or place (ICOMOS 2013: 2).

With respect to Aboriginal heritage, it is possible to identify two major streams in the overall significance assessment process: the assessment of *scientific value(s)* by archaeologists and the assessment of *social (or cultural) value(s)* by Aboriginal people. Each is considered separately below.

Table 9 Values relevant to determining cultural significance, as defined by The Burra Charter (ICOMOS 2013)

Value	Definition
Aesthetic	“Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use” (ICOMOS 2013).
Historic	“Historic value encompasses the history of aesthetics, science and society...[a] place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may have historic value as the site of an important event” (ICOMOS 2013).
Scientific	“The scientific or research value of a place will depend on the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information” (ICOMOS 2013).
Social	“Social value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group” (ICOMOS 2013).

8.2 Scientific Value

Scientific value refers to the importance of a place in terms of its rarity, representativeness and the extent to which it may contribute further information (i.e., its research potential) (OEH 2011: 9).

8.2.1 Rarity and Representativeness

Rarity and *representativeness* are related concepts. Rarity refers to the relative uniqueness of a site within its local and regional context. The scientific significance of a site is assessed as higher if it is

unique or rare within either context. Conversely, it is considered to be of lower significance if it is common in one or both. The concept of representativeness, meanwhile, refers to the question of whether or not a site is “a good example of its type, illustrating clearly the attributes of its significance” (Burke & Smith 2004: 247). Representativeness is an important criterion as one of the primary goals of cultural heritage management is to preserve for future generations a representative sample of all archaeological site types in their full range of environmental contexts.

In common with rarity, assessments of representativeness within a region are dependent on the state of current knowledge concerning the number and type of archaeological sites present within that region². This is a critical point, for as suggested by Kuskie (2000) and others (e.g., Bowdler 1981; Godwin 2011; Pearson & Sullivan 1995), the absence across most of Australia of regional-scale quantitative data for Aboriginal sites and places represents a major constraint in assessments of representativeness and rarity. As stressed by Bowdler (1981) some 30 years ago, detailed regional-scale assessments of the Aboriginal archaeological record of Australia are required to address this issue.

8.2.2 Research Potential

Research potential can be defined as the potential of an archaeological site to address what Bowdler (1981: 129) has referred to as “timely and specific research questions”. These questions may relate to any number of issues concerning past human lifeways and environments and, as suggested by Bowdler’s quote, will inevitably reflect current trends or problems in academic research (Burke & Smith 2004: 249). For their part, Bickford and Sullivan (1984: 23-4) suggest that the research potential of an archaeological site can be determined by answering the following series of questions:

1. Can the site contribute knowledge which no other resource can?
2. Can the site contribute knowledge which no other such site can?
3. Is this knowledge relevant to general questions about human history or other substantive subjects?

Several criteria can be used to assess the research potential of an archaeological site. Particularly important in the context of Aboriginal archaeology are the intactness or integrity of the site in question, its complexity and its potential for archaeological deposit (NSW National Parks and Wildlife Service 1997: 7). The connectedness of the site to other sites or natural landscape features may also be relevant.

Integrity refers to the extent to which a site has been disturbed by natural and/or anthropogenic phenomena and includes both the state of preservation of particular remains (e.g., animal bones, plant remains) and, where applicable, stratigraphic integrity. Assessments of archaeological integrity are predicated on the notion that undisturbed or minimally disturbed sites are likely to yield higher quality archaeological and/or environmental data than those whose integrity has been significantly compromised by natural and/or anthropogenic phenomena. Establishing levels of preservation or integrity in the context of a surface survey is difficult. Nonetheless, useful rating schemes are available for ‘open’ sites (Coutts & Witter 1977: 34) and scarred trees (Long 2003).

The *complexity* of a site refers primarily to the nature or character of the artefactual materials or features that constitute it but also includes site structure (e.g., the physical size of the site, spatial patterning in observed cultural materials). In the case of open artefact sites, for example, the principal criteria used to assess complexity are the site’s size (i.e., number of artefacts and/or spatial extent), the presence, range and frequency of artefact and raw material types, and the presence of features such as hearths.

Potential for archaeological deposit refers to the potential of a site to contain subsurface archaeological evidence which may, through controlled excavation and analysis, assist in answering questions that are of contemporary archaeological interest. Assessing subsurface potential in the absence of subsurface investigation is difficult. Nonetheless, consideration of a range of factors, including the integrity of the site, the complexity of extant surface evidence, the nature of the local geomorphology (as established

² There is, of course, a temporal fluidity to this criterion (i.e., as knowledge of the Aboriginal archaeology of a region increases, assessed levels of representativeness may change, a point of equal relevance to rarity).

through surface observations and documentary research) and the results of previous archaeological excavations in the area, will help inform assessment of this criterion.

Connectedness concerns the relationship between archaeological sites within a given area and may be expressed through a combination of factors such as site location, type and contents. It may, for example, be possible to establish a connection between a stone quarry and hatchet found nearby. Demonstrating connectedness archaeologically, however, is far from straightforward, especially when dealing with surface evidence alone. Ultimately, this difficulty rests with the need to demonstrate contemporaneity between sites that may have been created hundreds, if not thousands, of years apart. As Shiner (2008: 13) has observed, “much of the surface archaeological record documents the accumulation of materials from multiple behavioural episodes occurring over long periods of discontinuous time”. Contemporaneity, then, needs to be demonstrated not assumed. Given the nature of the archaeology within the Modification Area and its nature and condition, demonstrating connectedness was not possible for this assessment.

8.3 Assessment of Scientific Significance

An assessment of the scientific significance for open artefact scatter site BESS-AS1-21 (23-4-0691) is presented in **Table 10** below. The significance rating of “scientific significance” is offered on the basis of the assessed research potential, rarity, representativeness, PAD, complexity and integrity.

Table 10 Scientific significance assessment

Site	Scientific significance ranking	Justification
BESS-AS1-21 (23-4-0691)	Low	Complexity - BESS-AS1-21 (23-4-0691) comprises 11 surface artefacts. - Test excavation completed in close proximity to the site did not identify subsurface archaeological deposit. - Locally and regionally common artefact types (i.e., scraper, complete flakes, flake shatter etc.). - One formed object identified (sensu Moore 2000) comprising a retouched flake (scraper). - Locally and regionally common raw materials (i.e., silcrete and quartz). Integrity - The site is considered in poor condition being located above a trench excavated for underground service utilities. Deposit character - Archaeological deposit not anticipated to be associated with the site. Rarity and representativeness - Surface artefact scatter sites are a locally and regionally common site type. - BESS-AS1-21 (23-4-0691) is a poor example of its type. Surface artefact sites with greater integrity/artefact counts/richness are known on a local and regional scale and offer comparable/higher research potential.

8.4 Cultural Values

Social or cultural value refers to the spiritual, traditional, historic and contemporary associations and attachments a place or area has for Aboriginal people and can only be identified through consultation with Aboriginal people (OEH 2011: 8). RAPs consulted for the current assessment have identified the following social or cultural values for the Modification Area:

- All Aboriginal objects within and surrounding the Modification Area are of high cultural significance;
- The Modification Area forms part of a broader cultural landscape utilised by Aboriginal people in the past;
- Aboriginal cultural material within the study area are physical reminders left by Ancestors that provide a tangible connection to contemporary Aboriginal people.

8.5 Historic Value

Historic value refers to the associations that a place has with a historically important person, event, phase or activity in an Aboriginal community (OEH 2011: 9). Historic values can but will not necessarily be represented by physical evidence.

Although situated within a broader landscape of high historical significance for contemporary Aboriginal people, the Modification Area itself is assessed as having low historical significance. Background research and consultation with RAPs for the modification did not identify the Modification Area as being associated with a historically important person, event, phase or activity in the Aboriginal community.

8.6 Aesthetic Value

Aesthetic value refers to the sensory, scenic, architectural and creative aspects of a place and is manifested through a range of physical and non-physical attributes (OEH, 2011: 9). Aesthetic values are not inherent in places but rather rest with peoples' sensory and emotional responses to them. Accordingly, radical variation in responses, both within and between social and cultural groups, is to be expected (NSW NPWS, 1997: 29). *Protecting Local Heritage Places: A National Guide for Local Government and Communities* (2009:43) provides the following questions to assist individuals and groups in determining the aesthetic values of heritage places:

- *Does the place have natural or cultural features which are inspirational or evoke strong feelings or special meanings?*
- *What are those features, and to what extent are they evocative?*
- *Is the place a distinctive feature that is a prominent visual landmark?*
- *Does the place evoke awe from its grandeur of scale? To what extent is this important?*
- *Does the place evoke a strong sense of age, history or time depth? How does it do this, and to what extent?*
- *Is the place symbolic for its aesthetic qualities? Has it been represented in art, poetry, photography, literature, folk-art, folklore mythology or other imagery?*
- *Does the place have outstanding composition qualities involving any combinations of colour, form, texture, detail, movement, unity, sounds, scents, spatial definition and so on? To what extent is this important?*

The Modification Area is assessed as having low aesthetic significance as the natural landscape of the subject properties has been extensively altered by historical and contemporary land use practices.

8.7 Statement of Significance

This assessment finds that the Aboriginal heritage values of the Modification Area rest principally with the Aboriginal archaeological objects identified within it. These objects attest to past Aboriginal use of the Modification Area and are considered culturally significant to Aboriginal people.

Figure 19 Significance assessment

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9.0 Impact Assessment

9.1 Summary of Proposed Impacts

As indicated in **Section 1.1**, following submission of the EIS, Transgrid now requires that AGLM connect the BESS to an alternative location within the Transgrid Broken Hill substation. This alternative location is north of the previously identified connection point meaning that the transmission line would cross existing overhead transmission lines. This change has meant that the transmission line between the Site and the Transgrid Broken Hill substation may need to be installed underground between the Site and the Transgrid Broken Hill substation (the “Modification Area”). If installed underground, the transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximate 1180 mm deep and 720 mm wide trench using a rubber tracked mini excavator or similar to minimise any potential environmental impacts;
- require a disturbance footprint approximately 20 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

Key ground surface impacts from the works would include:

- Vegetation removal;
- Bulk cut and fill earthworks;
- Installation of utilities via trenching; and
- Environmental rehabilitation works.

9.2 Impacts to Identified Aboriginal Sites

Reference to the proposed works within the Modification Area are anticipated to directly impact Aboriginal site BESS-AS1-21 (23-4-0691). Consideration of the location of the site in relation to the proposed works indicates that it is located partially within the Modification Area and would therefore be partially impacted. However, given the proximity to the Modification Area, and the potential for inadvertent impacts, it is assumed that the entire site would be impacted. For BESS-AS1-21 (23-4-0691) movement of the artefacts to a safe location nearby prior to any construction works is proposed. Movement of the artefacts prior to impact is considered to result in a partial loss of value of the site with its original context being destroyed but with the objects themselves not impacted. **Table 11** provides a summary of site impacts in the format provided in Heritage NSW’s AHIP application.

Table 11 Impact assessment for Aboriginal sites

AHIMS site information								Proposed harm		
Portion of site (whole or part – include map reference if part)	AHIMS site ID	Site feature (there may be more than one site feature per site ID)	Site name			Datum (AGD or GDA)	Zone	Type of harm1	Degree of harm2	Consequence of harm3
Whole	23-4-0691	Artefact	BESS-AS1- 21			GDA	54	Movement (collection) only	Whole	Partial loss of value

1 'Will not be harmed' / 'Movement (collection) only' / 'Excavation' / 'Community collection' / 'Directly harmed'

2 'Whole' / 'Partial' / 'None'

3 'Total loss of value' / 'Partial loss of value' / 'No loss of value'

Figure 20 Impact assessment

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9.3 Cumulative Impact Assessment

9.3.1 Assessment of Ecologically Sustainable Development

In NSW, the NPW Act provides the legislative framework for the protection of Aboriginal objects and places. Section 2A(2) of the NPW Act stipulates that such protection is to be achieved by applying the principles of Ecologically Sustainable Development (ESD). ESD requires the integration of economic and environmental considerations (including cultural heritage) in decision-making processes and, in the context of Aboriginal cultural heritage, can be achieved through the implementation of two key principles: intergenerational equity and the precautionary principle.

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations. With regards to Aboriginal heritage, intergenerational equity can be assessed in terms of cumulative impacts to Aboriginal objects and places in a region. Central to any assessment of intergenerational equity is the proposition that regions with fewer Aboriginal objects and places necessarily retain fewer opportunities for future generations of Aboriginal people to enjoy their cultural heritage. Accordingly, information regarding the known and potential Aboriginal heritage resource of a given region is critical to any assessment of intergenerational equity.

The precautionary principle holds that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In NSW, the precautionary principle is relevant to Heritage NSW's consideration of potential impacts to Aboriginal cultural heritage in situations where:

- the proposed development involves a risk of serious or irreversible damage to Aboriginal objects or places or to the value of those objects or places; and
- there is uncertainty about the Aboriginal cultural heritage values or scientific or archaeological values, including in relation to the integrity, rarity or representativeness of the Aboriginal objects or places proposed to be impacted.

In these instances, Heritage NSW has indicated that a precautionary approach should be taken, and all cost-effective measures implemented to prevent or reduce damage to Aboriginal objects and/or places. In addition to these measures, a cumulative impact assessment should be undertaken to gain an understanding and appreciation of the impact's development will have on NSW's Aboriginal cultural heritage resource.

It should be noted that the results of cumulative impact assessments undertaken for cultural heritage sites and places, Aboriginal or otherwise, must be interpreted with caution, not least because they are based (in part) on heritage datasets that are inevitably incomplete and contain various inconsistencies and errors. Godwin (2011), in particular, has questioned the value of cumulative impact assessments to cultural heritage management in Australia, arguing that the 'fundamentals' necessary for undertaking such assessments simply do not exist. The 'fundamentals' Godwin is referring are robust regional and national data sets for measuring proposed impacts and the determination of acceptable scientific and cultural impact thresholds. While recognising the validity of the issues raised by Godwin (2011), current Heritage NSW guidelines necessitate that a cumulative impact assessment be undertaken as part of any Aboriginal cultural heritage assessment in NSW.

9.3.2 Intergenerational Equity - Cumulative Impact Assessment

Two avenues for assessing the cumulative impact of the Project on Aboriginal heritage can be pursued:

1. A comparison, using the results of AHIMS searches, of the identified Aboriginal archaeological values of the Modification Area with that of an arbitrary 10 x 10 km (100 km²) area roughly centred on the Modification Area; and
2. The use of existing environmental data sources (e.g., digital land use data and topographic maps) to identify the potential open artefact resource of a 20 km x 20 km area.

9.3.3 Known Resource

Alongside those identified within the Modification Area, existing open artefact sites in the study region offer opportunities for future research, conservation and education. Accordingly, it is necessary to quantify the impacts of the proposed development on this joint resource.

As indicated in **Section 7.3**, one Aboriginal site has been identified within the Modification Area that will be fully impacted by proposed works. AHIMS data indicate that this site represents 2.4% of the extant open artefact sites within the study region (10 km x 10 km area), with a search of the AHIMS database on 25 November 2021 returning 41 'Valid' open artefact sites for this search region. While acknowledging the limitations of the AHIMS database with respect to the validity of listed site statuses, on the basis of these data, it seems reasonable to conclude that the loss of this site would not constitute a moderate adverse impact to the known open artefact resource of the search area.

9.3.4 Potential Resource

AHIMS results only represent a fraction of the likely archaeological resource present within a region, as these results are only representative of land that has been subject to archaeological investigations. Accordingly, an assessment of the *potential* Aboriginal heritage resource of an approximate 20 x 20 km study region roughly centred on the Modification Area is also a useful guide. For the present analysis, land use data (dated 2017) obtained from the NSW Government SEED resource was utilised (**Table 12**).

As a starting point, it is necessary to quantify the amount of land within the study region that has the *potential* to retain open artefact sites. A basic assumption here is that grossly disturbed terrain is unlikely to retain such sites whereas non-grossly disturbed terrain does, both in surface and subsurface contexts.

Analysis of available digital land use data for the study region is summarised in **Table 12**. This analysis indicates that grossly modified or disturbed terrain (e.g., urban and industrial areas) accounts for approximately 11.54% of land within the region. Conversely, land not subject to gross disturbances such as fully to semi-cleared grazing land and horticulture is well represented, accounting for 88.48% of land within the region.

Table 12 Land use analysis for study region (20 x 20 km)

Existing Land Use	km ²	%	Archaeological Potential?
Nature conservation	0.03	0.01	Yes
Other minimal use	23.88	5.99	Yes
Grazing native vegetation	325.07	81.51	Yes
Production native forestry	3.60	0.90	Yes
Irrigated perennial horticulture	0.03	0.01	Yes
Marsh/wetland	0.24	0.06	Yes
Residential and farm infrastructure	13.88	3.48	No
Manufacturing and industrial	1.27	0.32	No
Intensive animal production	0.47	0.12	No
Services	6.93	1.74	No
Utilities	1.78	0.45	No
Transport and communication	7.88	1.98	No
Mining	9.46	2.37	No

Existing Land Use	km ²	%	Archaeological Potential?
Waste treatment and disposal	0.92	0.23	No
Reservoir/dam	0.43	0.11	No
River	2.89	0.73	No
Channel/aqueduct	0.04	0.01	No
Total	398.8	100	-

Viewed from an Aboriginal archaeological perspective, the results of the land use analysis presented in **Table 12** suggest that approximately 88.48% of the study region (c.353 km²) can reasonably be considered to comprise a *potential open artefact resource*. As indicated, land upon which open artefact deposits are unlikely to survive accounts for just over 11.54% of land within the region. This figure increases to 93.05% if agricultural and grazing land is included. However, as indicated by the results of numerous Aboriginal archaeological investigations, both within and outside of the study region, cropped and grazed areas can and frequently do retain significant surface and subsurface stone artefact records. It can, therefore, be concluded that around 88.48% of land within the study region has the potential to retain open artefact sites. While acknowledging the fact that the nature and distribution of such deposits will vary markedly in relation to environmental variables such as landform and the availability of potable water, analysis of available land use data does help to quantify the extent of the region's potential Aboriginal open artefact resource. Moreover, it provides a basis from which the cumulative impact of the proposed development on this resource can be assessed.

In order to quantify the impact of the proposed development on the potential open artefact resource of the study region it is necessary to compare the amount of impacted land within the Modification Area that could be considered a potential open artefact resource (i.e., 0.0034 km²) with that available in the search area (i.e., 353 km²). On this basis, it can be stated that the modification will result in a small fraction decline in the region's potential open artefact resource. As such, it can be concluded that the impact of the modification on the potential Aboriginal archaeological resource of the region will be low.

With regards to the existence, outside of the Modification Area, of environmental contexts that have the potential to contain sites comparable to those identified within it, an examination of relevant topographic maps for the study region indicates that many such contexts exist including, for example, unmodified land adjacent to Kelly Creek as well as a number of local watercourses. On the basis of this evidence, it can be confidently concluded that land outside of the current Modification Area but within the wider region contains a large, as yet unidentified, open artefact site resource.

9.4 The Precautionary Principle

As indicated in **Section 9.3.1**, the precautionary principle holds that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

In the context of the current assessment, it can be stated that AECOM has adopted a precautionary approach in our assessment of the impacts of the proposed development on the Aboriginal archaeological resource of the Modification Area and that this approach is reflected in our proposed management strategy.

9.5 Avoiding and Minimising Harm

This assessment finds that the Aboriginal heritage values of the modification rest principally with the Aboriginal archaeological site that has been identified within it. Considering the results of the survey and test excavation program a single Aboriginal site is recognised within the Modification Area. This site comprises a single open artefact scatter consisting of 11 stone artefacts. The site, BESS-AS1-21 (23-4-0691), has been assessed as of low scientific significance, both on the basis of its contents and also its poor, disturbed condition.

As indicated in **Section 9.0**, proposed works within the Modification Area are anticipated to directly impact BESS-AS1-21 (23-4-0691). Consideration of the location of the site in relation to the proposed works indicates that it is located partially within the modification's construction footprint and would therefore be partially impacted. However, given the proximity to the construction footprint, and the potential for inadvertent impacts, it is assumed that the entire site would be impacted.

Considering the nature, condition and significance of the site, mitigation has been restricted to movement only with further archaeological excavation or conservation not recommended. In making this recommendation, AECOM notes the following:

- The site has been assessed as of low scientific significance
- The site comprises low densities of archaeological material that are common in the region
- The site has limited research potential
- The site is in poor condition having been disturbed by installation of underground utilities.

For BESS-AS1-21 (23-4-0691) movement of the artefacts to a safe location nearby prior to any construction works is considered appropriate mitigation. This mitigation was proposed by RAPs participating in the fieldworks and is supported by AECOM. Movement of the artefacts prior to impact is considered to result in a partial loss of value of the site with its original context being destroyed but with the objects themselves not impacted.

10.0 Management Recommendations

The following management recommendations are made regarding the identified Aboriginal heritage values of the Modification Area, with recommendations made on the basis of:

- a review of previous archaeological investigations completed within and surrounding the Project Area;
- the results of the archaeological investigation described in **Section 7.0**
- the significance and impact assessments detailed in **Sections 8.0** and **9.0**
- consultation with RAPs.

10.1 Statutory Requirements

As indicated in **Section 1.0**, approval for the modification is being sought under section 4.55 of the EP&A Act. A Modification Report and supporting appendices have been prepared to accompany the application to modify Development Consent SSD-11437498.

This ACHAR documents the results of AECOM's assessment and has been compiled with reference to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

10.2 Management Strategy

This assessment has identified a single Aboriginal heritage site within the Modification Area comprising an open artefact scatter consisting of 11 surface artefact – BESS-AS1-21 (23-4-0691). The impact assessment undertaken in **Section 9.0** has identified that this site will be impacted by the proposed works.

A mitigation strategy to address the impacts of the modification on the known Aboriginal heritage values is provided below. It is recommended that the Project's Aboriginal Cultural Heritage Management Plan (ACHMP) be updated to include details of this strategy.

10.2.1 Movement of Aboriginal Objects

Aboriginal archaeological site BESS-AS1-21 (23-4-0691) has been assessed as being of low scientific significance. In order to mitigate the impact of the proposed works on this site, it is recommended that all surface artefacts present within the boundary of this site, shown on **Figure 18**, be relocated to an area nearby that would not be impacted by the works. Artefact relocation should be undertaken by a qualified archaeologist and appropriate number of RAP field representatives. Once complete, the site card for BESS-AS1-2021 should be updated to reflect implementation of this mitigation measure.

10.2.2 Previously Unrecorded Aboriginal Objects and Places

In the event that previously recorded Aboriginal objects or places are identified during the Project, the procedures outlined in the Project's ACHMP should be followed.

10.2.3 AHIMS Site Cards

AHIMS site cards have been completed and submitted to Heritage NSW for all recorded sites within the Modification Area.

In the event that a previously unidentified Aboriginal site is discovered within the Modification Area at any point during the operational life of the Project (as modified), an AHIMS site card for that site should be submitted to Heritage NSW as promptly as possible. Timing protocols for the submission of AHIMS site cards should be included in the ACHMP for the Project.

10.2.4 Aboriginal Site Inductions

An Aboriginal site induction package should be developed for use throughout the life of the Project (as modified). This package should be developed prior to the commencement any ground disturbance

works and provide details of the location and nature of Aboriginal sites within and within close proximity to the Modification Area. The induction should be mandatory for all staff and contractors whose roles may reasonably bring them into contact with Aboriginal sites. A register of all persons having completed the training package should be maintained throughout the life of the Project (as modified).

10.2.5 Management of Potential Human Remains

In the event that potential human skeletal remains are identified at any point during the life of the development, the procedures outlined in the Project's ACHMP should be followed. This procedure is included below.

In the event that potential human skeletal remains are identified at any point during the life of the development, the following standard procedure (NSW Police Force 2015; NSW Health 2013) should be followed:

1. all work in the vicinity of the remains should cease immediately
2. the location should be cordoned off - work can continue outside of this area as long as there is no risk of interference to the remains or the assessment of the remains
3. where it is reasonably obvious from the remains that they are human, the Project Manager (or a delegate) should inform the NSW Police by telephone (prior to seeking advice from a forensic specialist)
4. where uncertainty over the origin (i.e., human or non-human) of the remains exists, a physical or forensic anthropologist should be commissioned to inspect the exposed remains in situ and make a determination of origin, ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern)
5. if the remains are identified as modern and human, notify NSW Police
6. if the remains are identified as pre-contact or historic Aboriginal, notify Heritage NSW using their Environment Line (131 555)
7. if the remains are identified as historic (non-Aboriginal), notify the NSW Heritage Division.

An Aboriginal community representative must be present where it is reasonably suspected burials or human remains may be encountered. If human remains are unexpectedly encountered and they are thought to be Aboriginal, the Aboriginal community must be notified immediately.

Recording of Aboriginal ancestral remains must be undertaken by, or be conducted under the direct supervision of, a specialist physical anthropologist or other suitably qualified person.

Archaeological reporting of Aboriginal ancestral remains must be undertaken by, or reviewed by, a specialist physical anthropologist or other suitably qualified person, with the intent of using respectful and appropriate language and treating the ancestral remains as the remains of Aboriginal people rather than as scientific specimens.

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Appendix A

Draft Assessment Methodology



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7 October 2021

Dear Registered Aboriginal Party,

RE: Modification to the Broken Hill Battery Energy Storage System project, located in the Broken Hill Local Government Area, NSW

I am writing to inform you that AGL Energy Limited (AGL) has engaged AECOM Australia Pty Ltd (AECOM) to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for a modification application under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to the recently approved Broken Hill Battery Energy Storage System project.

AGL 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 Project). The approved location of the Project (the Site) is at two lots located at 74 to 80 Pinnacles Place, Broken Hill NSW 2880 (Lots 57 and 58 of DP 258288). 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 submission of the Environmental Impact Statement (EIS), TransGrid now requires that AGL connect the BESS to an alternative location within the TransGrid Broken Hill substation. This alternative location is to the north of the previously identified connection point meaning that the transmission line would cross existing overhead transmission lines. This change has meant that the transmission line between the Site and the TransGrid Broken Hill substation now needs to be installed underground between the Site and the TransGrid Broken Hill substation (the "Project Area"). The underground transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximate 600 mm wide trench using a rubber tracked mini excavator or similar to minimise any potential environmental impacts;
- require a disturbance footprint approximately 4 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

As a Registered Aboriginal Party (RAP) for this Project, please find enclosed for your review the proposed ACHAR Methodology for the modification. The proposed methodology details AECOM's proposed approach to the assessment and is being provided to all RAPs in accordance with Sections 4.3.1 and 4.3.2 of the Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a) and clause 60 of the *National Parks and Wildlife Regulation, 2019*. It noted that this methodology is consistent with the methodology used for the broader Broken Hill Battery Energy Storage System project.

All comments on the proposed methodology must be received by 14 October 2021. Comments can be provided in writing or by phone. Comments on the cultural values of the Project Area and on the proposed methodology can be provided at any stage up until the end of the draft ACHAR review period.

Geordie Oakes
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We look forward to your participation in the assessment.

Yours faithfully

A handwritten signature in dark ink, appearing to read "G. Oakes", is positioned above the printed name.

Geordie Oakes
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Modification to the Broken Hill Battery Energy Storage System Project - Proposed Aboriginal Cultural Heritage Assessment Methodology

1.0 Background to the Current Assessment

AGL has received development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) in capacity at Broken Hill NSW (the Project). The approved location of the Project (the Site) is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). 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 also 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.

In 2021, AECOM completed an ACHAR for the Project that was used to support the Environmental Impact Statement (EIS). As part of the assessment, a field team of two AECOM heritage specialists and Registered Aboriginal Parties (RAPs) representatives completed the archaeological survey within the Site and transmission line corridor on Wednesday 20 January 2021. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey. RAPs identified two lithic items they considered might potentially be artefacts. While neither item satisfied technical criteria for identification as a stone artefact, as a precautionary measure, both were moved outside of areas of potential ground surface disturbance by the attending RAP field representatives.

2.0 Modification Overview

Following submission of the EIS, TransGrid now requires that AGL connect the BESS to an alternative location within the substation (Figure 1). This alternative location is to the north of the one previously identified. The transmission line will now cross existing overhead transmission lines and as such needs to be installed underground between the Site and the TransGrid Broken Hill substation (the "Project Area"). The underground transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximately 600 mm wide trench using a rubber tracked mini excavator or similar to minimise environmental impacts;
- require a disturbance footprint approximately 4 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

To accommodate the revised transmission alignment, a modification application will be required in accordance with Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).



3.0 Project Area

The Project Area for the Modification, as shown on Figure 1, comprises the new underground transmission line alignment between the Site and TransGrid Broken Hill substation. Land within the Project Area is generally undisturbed and not in use with the exception of dirt access roads adjacent to the TransGrid Broken Hill Substation.

Reference to the Geographical Names Board of NSW confirms that the Project Area falls wholly within the boundaries of the Broken Hill LGA within the parish of Nadbuck in the County of Yancowinna. Surrounding villages include Stephens Creek to the north, Silverton and Burns to the west, and Mount Gipps to the east.

4.0 Archaeological Context

4.1 AHIMS Database

The AHIMS database, administered by Heritage NSW, contains records of all Aboriginal objects reported to the Chief Executive of the Office of Environment and Heritage in accordance with Section 90Q of the NPW Act. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database undertaken on 15 December 2020 for a 10 x 10 km area centred on the Project Area, extending 5 km to the north, south, east and west, resulted in the identification of 50 Aboriginal sites, comprising 40 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site (Table 1).

Consideration of the location of previously recorded Aboriginal sites indicates that no previously recorded Aboriginal sites are located wholly or partially within the Project Area. The closest site – open artefact site "Kanandah 1" (AHIMS #23-4-0640) is located around 390 m to the south of the Project Area.

Table 1 Site search results (10 x 10 km area)

Site Type	Count	% site type
Open artefact site (i.e., isolated artefacts and artefact scatters)	40	80
Stone quarry	7	14
Hearths	2	4
Resource and gathering site	1	2
Total	50	100

5.0 Proposed Methodology

The approach that AECOM intends to adopt for undertaking the assessment includes the following key components:

1. Background research;
2. Undertake an archaeological survey of the Project Area;
3. Consultation with RAPs in order to identify the Aboriginal cultural heritage values of the Project Area; and
4. Preparation of a draft ACHAR for the Project Area detailing the results of the above. Potential impacts and management/mitigation measures for the identified Aboriginal heritage values of the Project Area will be provided in the draft ACHAR. The following steps would be included during this stage:
 - a. Provision of the draft ACHAR report to the RAPs for review and comment.



- b. RAP provides comments on the draft ACHAR report.
- c. Finalisation of draft ACHAR report in consideration of RAP comments.

The proposed methodologies for each of these components are detailed in the sections below.

5.1 Background Research

The following tasks will be undertaken for the background research component of the assessment:

- Updated search of Heritage NSW's AHIMS database;
- A review of associated site cards and reports to clarify site contents, extents and statuses;
- A review of the landscape context of the Project Area, with a particular emphasis on its implications for the nature and distribution of Aboriginal archaeological materials;
- A review of relevant archaeological and ethnohistoric information for the Project Area and environs including AECOM's (2021) assessment for the Project; and
- Preparation of a predictive model for the Aboriginal archaeological record of the Project Area.

5.2 Archaeological Survey

AECOM proposes to undertake a "full coverage" archaeological survey across the Project Area. The survey will be undertaken by a combined field team of AECOM archaeologists and an appropriate number of RAP field representatives. While vehicles may be used to transport the survey team between survey localities, all survey will be completed on foot. A single linear transect will be completed along the alignment of the transmission line corridor. The location of all transects completed during the survey, including their start and end points, will be recorded using one of two handheld differential GPS units, with associated transect data (e.g., levels of visibility and exposure, disturbance factors) entered directly into the same unit upon the completion of each transect.

All Aboriginal archaeological sites identified during the survey will be recorded to the standard required by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. All sites will be comprehensively photographed following artefact recording and registered on Heritage NSW's AHIMS database.

5.3 Cultural Values

RAP representatives are in the best position to provide information on the Aboriginal social/cultural heritage values of a given area. During the assessment process, AECOM archaeologists will consult with RAPs regarding the cultural heritage values of objects and places in the Project Area. This will include the discussion of cultural heritage values with RAPs throughout the process until the end of the draft ACHAR review period and provision of the draft ACHAR to all RAPs for comment prior to finalisation.

The identification of cultural values will include places of social, spiritual and cultural value, historic places with cultural significance, and potential places/areas of historic, social, spiritual and/or cultural significance.

As noted in Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), some information obtained from registered Aboriginal parties may be sensitive or have restricted public access. AECOM, in consultation with relevant RAPs, will develop appropriate protocols for sensitive or restricted information, including:

1. Cultural restrictions on access to the material.
2. Cultural restrictions on communication of the material.
3. Cultural restrictions on the location of the material.
4. Cultural recommendations on handling the material.
5. Any other contextual information.
6. The names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the Aboriginal material and the degree of authorisation.
7. Details of any consent given in accordance with customary law.
8. Level of confidentiality to be accorded to the material.
9. Access and use, by the registered Aboriginal parties, of the cultural information in the material.



It is also noted that the purpose of community consultation with Aboriginal people is to assist AECOM and AGL in the preparation of an application for an Aboriginal Heritage Impact Permit (although such a permit is not expected to be necessary given the Project is a SSD (DECCW, 2010a).

5.4 Preparation of an ACHAR

AECOM will prepare an ACHAR for the Modification detailing the results of the above assessment and consultation with RAPs. The ACHAR will provide appropriate management and mitigation measures for the Project Area's Aboriginal heritage values.

RAPs will be provided a copy of the draft ACHAR report and will have the opportunity to comment on management and mitigation options proposed in the draft ACHAR report.

The final ACHAR report will incorporate any comments from the RAPs.

6.0 Modification Timeline

Current proposed timelines for the ACHAR are:

- Collation of culturally significant information – ongoing throughout process until the end of the draft ACHAR review period.
- RAP review of this draft proposed methodology – October 2021.
- Field survey – Mid October 2021
- Provision of a draft ACHAR report to each RAP for review and comment – October/November 2021
- Period for comment on the draft ACHAR report – a minimum of 28 days following provision of the draft report.
- Preparation of a final ACHAR report in consideration of comments received.

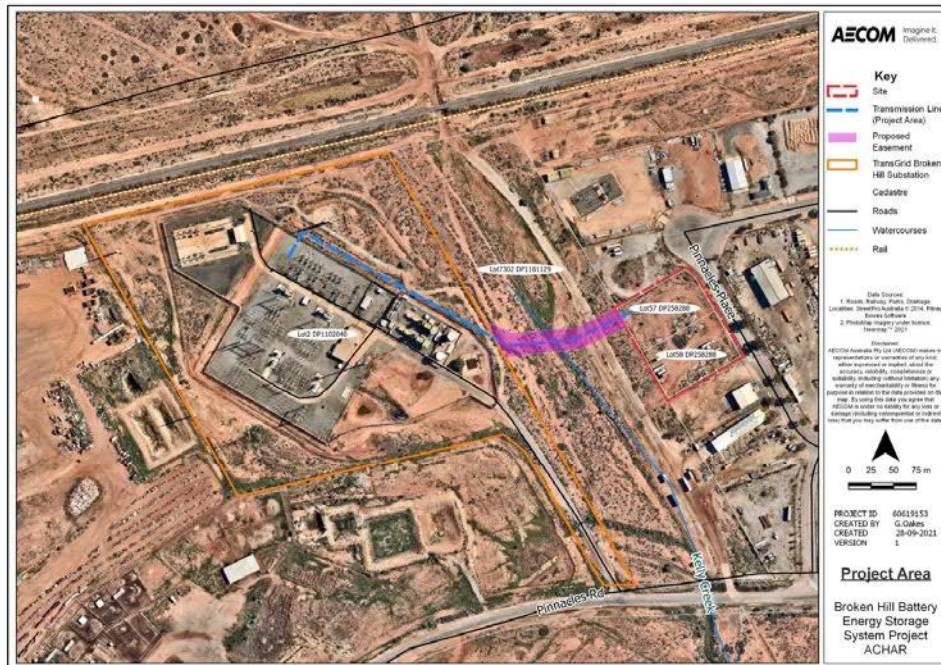
The above timelines are indicative only and are subject to change.

7.0 References

- AECOM Australia Pty Ltd. (2021). *Broken Hill Battery Energy Storage System Project Aboriginal Cultural Heritage Assessment Report*. Unpublished report for AGL.
- NSW Department of Environment Climate Change & Water. (2010a). *Aboriginal Cultural Heritage Consultation Requirements for Proponents*. Department of Environment, Climate Change and Water.
- NSW Department of Environment Climate Change & Water. (2010b). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water.

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Figure 1: Project Area



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15 October 2021

Dear Registered Aboriginal Party,

RE: Modification to the Broken Hill Battery Energy Storage System project, located in the Broken Hill Local Government Area, NSW

Please find below an updated draft methodology that includes the allowance for archaeological test excavation within the modified transmission line corridor (the Project Area). This methodology has been updated in response to a Registered Aboriginal Party (RAP) request. The remainder of the methodology has not been modified.

Accordingly, the period for review of the methodology has been extended to 4 November 2021 allowing a full 28 days review period. Comments can be provided in writing or by phone. Comments on the cultural values of the Project Area and on the proposed methodology can be provided at any stage up until the end of the draft ACHAR review period.

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We look forward to your participation in the assessment.

Yours faithfully

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Modification to the Broken Hill Battery Energy Storage System Project - Proposed Aboriginal Cultural Heritage Assessment Methodology

1.0 Background to the Current Assessment

AGL Energy Limited (AGL) has received development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) in capacity at Broken Hill NSW (the Project). The approved location of the Project (the Site) is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). 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 also 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.

In 2021, AECOM completed an ACHAR for the Project that was used to support the Environmental Impact Statement (EIS). As part of the assessment, a field team of two AECOM heritage specialists and Registered Aboriginal Parties (RAPs) representatives completed the archaeological survey within the Site and transmission line corridor on Wednesday 20 January 2021. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey. RAPs identified two lithic items they considered might potentially be artefacts. While neither item satisfied technical criteria for identification as a stone artefact, as a precautionary measure, both items were moved outside of areas of potential ground surface disturbance by the attending RAP field representatives.

2.0 Modification Overview

Following submission of the EIS, TransGrid now requires that AGL connect the BESS to an alternative location within the substation (Figure 1). This alternative location is to the north of the one previously identified. The transmission line will now cross existing overhead transmission lines and as such needs to be installed underground between the Site and the TransGrid Broken Hill substation (the "Project Area"). The underground transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximately 600 mm wide trench using a rubber tracked mini excavator or similar to minimise environmental impacts;
- require a disturbance footprint approximately 4 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

To accommodate the revised transmission alignment, a modification application will be required in accordance with Section 4.55(2) of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*.

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Figure 1: Project Area



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3.0 Project Area

The Project Area for the modification application, as shown on Figure 1, comprises the new underground transmission line alignment between the Site and the TransGrid Broken Hill substation. Land within the Project Area is generally undisturbed and not in use, with the exception of dirt access roads adjacent to the TransGrid Broken Hill Substation.

Reference to the Geographical Names Board of NSW confirms that the Project Area falls wholly within the boundaries of the Broken Hill LGA within the parish of Nadbuck in the County of Yancowinna. Surrounding villages include Stephens Creek to the north, Silverton and Burns to the west, and Mount Gipps to the east.

4.0 Archaeological Context

4.1 AHIMS Database

The AHIMS database, administered by Heritage NSW, contains records of all Aboriginal objects reported to the Director General of the Department of Premier and Cabinet in accordance with Section 90Q of the NPW Act. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database undertaken on 15 December 2020 for a 10 x 10 km area centred on the Project Area, extending 5 km to the north, south, east and west, resulted in the identification of 50 Aboriginal sites, comprising 40 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site (Table 1).

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Table 1 Site search results (10 x 10 km area)

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Stone quarry	7	14
Hearths	2	4
Resource and gathering site	1	2
Total	50	100

5.0 Proposed Methodology

The approach that AECOM intends to adopt for undertaking the assessment includes the following key components:

1. Background research;
2. Undertake a program of archaeological survey and test excavation of the Project Area;
3. Consultation with RAPs in order to identify the Aboriginal cultural heritage values of the Project Area; and
4. Preparation of a draft ACHAR for the Project Area detailing the results of the above. Potential impacts and management/mitigation measures for the identified Aboriginal heritage values of the Project Area will be provided in the draft ACHAR. The following steps would be included during this stage:
 - a. Provision of the draft ACHAR report to the RAPs for review and comment.



- b. Provision of comments from RAPs on the draft ACHAR report.
- c. Finalisation of draft ACHAR report in consideration of RAP comments.

The proposed methodologies for each of these components are detailed in the sections below.

5.1 Background Research

The following tasks will be undertaken for the background research component of the assessment:

- Updated search of Heritage NSW's AHIMS database;
- A review of associated site cards and reports to clarify site contents, extents and statuses;
- A review of the landscape context of the Project Area, with a particular emphasis on its implications for the nature and distribution of Aboriginal archaeological materials;
- A review of relevant archaeological and ethnohistoric information for the Project Area and environs including AECOM's (2021) assessment for the Project; and
- Preparation of a predictive model for the Aboriginal archaeological record of the Project Area.

5.2 Archaeological Survey

AECOM proposes to undertake a "full coverage" archaeological survey across the Project Area. The survey will be undertaken by a combined field team of AECOM archaeologists and an appropriate number of RAP field representatives. While vehicles may be used to transport the survey team between survey localities, all survey will be completed on foot. A single linear transect will be completed along the alignment of the transmission line corridor. The location of all transects completed during the survey, including their start and end points, will be recorded using one of two handheld differential GPS units, with associated transect data (e.g., levels of visibility and exposure, disturbance factors) entered directly into the same unit upon the completion of each transect.

All Aboriginal archaeological sites identified during the survey will be recorded to the standard required by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. All sites will be comprehensively photographed following artefact recording and registered on Heritage NSW's AHIMS database.

5.3 Archaeological Test Excavation

A program of archaeological test excavation will be completed within the Project Area. For the current assessment, it is proposed that test pits be placed at 20 m intervals along the transmission line corridor resulting in approximately 17 test pits being excavated (Figure 1). Test pits will be hand excavated in 0.25 m² (i.e., 50 x 50 cm) units and will be dry sieved through a 5 mm mesh to a maximum depth of 1.2 m.

All subsurface testing will be carried out in accordance with Requirement 16a, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). Results from the data will be used in conjunction with survey results to inform management recommendations included in an ACHAR prepared in accordance with Requirement 11 of the Code of Practice. Aboriginal objects recovered during subsurface testing will be curated in accordance with Requirement 26 of the Code of Practice.

5.4 Cultural Values

RAP representatives are in the best position to provide information on the Aboriginal social/cultural heritage values of a given area. During the assessment process, AECOM archaeologists will consult with RAPs regarding the cultural heritage values of objects and places in the Project Area. This will include the discussion of cultural heritage values with RAPs throughout the process until the end of the draft ACHAR review period and provision of the draft ACHAR to all RAPs for comment prior to finalisation.

The identification of cultural values will include places of social, spiritual and cultural value, historic places with cultural significance, and potential places/areas of historic, social, spiritual and/or cultural significance.

As noted in Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), some information obtained from RAPs may be sensitive or have restricted public access. AECOM, in consultation with relevant RAPs, will develop appropriate protocols for sensitive or restricted information, including:

1. Cultural restrictions on access to the material.
2. Cultural restrictions on communication of the material.
3. Cultural restrictions on the location of the material.
4. Cultural recommendations on handling the material.
5. Any other contextual information.
6. The names and contact details of persons authorised within the relevant Aboriginal group to make decisions concerning the Aboriginal material and the degree of authorisation.
7. Details of any consent given in accordance with customary law.
8. Level of confidentiality to be accorded to the material.
9. Access and use, by the registered Aboriginal parties, of the cultural information in the material.

It is also noted that the purpose of community consultation with Aboriginal people is to assist AECOM and AGL in the preparation of an application for an Aboriginal Heritage Impact Permit (although such a permit is not expected to be necessary given the Project is a SSD (DECCW, 2010a).

5.5 Preparation of an ACHAR

AECOM will prepare an ACHAR for the modification application detailing the results of the above assessment and consultation with RAPs. The ACHAR will provide appropriate management and mitigation measures for the Project Area's Aboriginal heritage values.

RAPs will be provided a copy of the draft ACHAR report and will have the opportunity to comment on management and mitigation options proposed in the draft ACHAR report.

The final ACHAR report will incorporate any comments from the RAPs.

6.0 Modification Timeline

Current proposed timelines for the ACHAR are:

- Collation of culturally significant information – ongoing throughout process until the end of the draft ACHAR review period.
- RAP review of this draft proposed methodology – October/November 2021.
- Fieldwork – early November 2021
- Provision of a draft ACHAR report to each RAP for review and comment – November/December 2021
- Period for comment on the draft ACHAR report – a minimum of 28 days following provision of the draft report.
- Preparation of a final ACHAR report in consideration of comments received.

The above timelines are indicative only and are subject to change.

7.0 References

AECOM Australia Pty Ltd. (2021). *Broken Hill Battery Energy Storage System Project Aboriginal Cultural Heritage Assessment Report*. Unpublished report for AGL.

NSW Department of Environment Climate Change & Water. (2010a). *Aboriginal Cultural Heritage Consultation Requirements for Proponents*. Department of Environment, Climate Change and Water.

NSW Department of Environment Climate Change & Water. (2010b). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water.

Appendix B

Consultation Log

Date	Group	Stakeholder Representative	Correspondence/Comments	AECOM Response
11/11/2020	Agency Letters Sent Out			
16/11/2020	NTS Corp	James McLeod	Please register Barkandji Native Title Group Aboriginal Corporation RNTBC (ICN 4740) as a RAP for this project. The Barkandji Corporation is the representative native title entity for the area affected by this project.	None required
19/11/2020	Broken Hill Council	Tracey Stephens	Council responded with a list of contacts	None required
20/11/2020	Local Land Services	Guy Gibbs	LLS responded "It is recommended by LLS Western that you contact the following Aboriginal Community groups regarding cultural heritage matters within the project area. Broken Hill LALC – 84 Oxide Street, Broken Hill NSW 2880. Phone (08) 80877310"	None required
24/11/2020	Broken Hill LALC	Joanne O'Donnell	Joanne called to register the LALC's interest in the project. Also, wanted to confirm that I was aware of the agreement between AGLM and the LALC. She also advised that there are two Traditional Owner groups in the area.	None required
3/12/2020	Heritage NSW	-	Provided the contact details for seven groups and individuals that may have an interest in registering for consultation. A second response was provided by Heritage NSW on 3 December 2020, with a further five names, some of which were previously provided.	None required
11/11/2020	Office of Registrar	-	Did not respond	None required
11/11/2020	NNTT	-	Did not respond	None required
3/12/2020	ROI request sent to stakeholders			
7/12/2020	Barkanndji #8 Native Title Determinants	Derek Hardman	Email sent to Barkanndji with EOI	None required
11/12/2020		Cally Doyle	Registered by Kristy Bennett	None required
18/12/2020	Broken Hill LALC	Joanne O'Donnell	Geordie called Joanne to get contact details for local RAP groups. Received details for Maureen O'Donnell and Barkanndji Native Title Group	None required
18/12/2020	Wilyakali Aboriginal Corporation	Maureen O'Donnell	Geordie spoke with Maureen to see if she was interested in registering for the project. Maureen stated she would like to register. Also updated contact details	None required

18/12/2020	Barkanndji #8 Native Title Determinants	Derek Hardman	Left message on Derek's phone to contact Geordie	None required
7/10/2021	Initial Methodology for Modification Sent			
12/10/2021	Wilyakali Aboriginal Corporation	Maureen O'Donnell	Maureen called and stated that she wanted site officers to inspect the new impact area. Geordie agreed that this was required.	None required
15/10/2021	Updated Methodology for Modification Sent			
15/12/2021	Draft ACHAR sent to RAPs			
14/01/2022	Email follow up sent to RAPs			
14/01/2022	Wilyakali Aboriginal Corporation	Maureen O'Donnell	Geordie spoke to Maureen regarding the ACHAR. Maureen was going to speak the site officers and revert.	None required

Appendix C

Lithics

Raw_Material	Heating	Type	Flake_Type	Core_Type	Platform_C	Length	Width	Thickness	Cortex	Cortex_(do	Platform_T	Core_Blank	Number_of_	Length_of_	Tool_Type	Tool_Condi	Tool_Blank	Retouch_Di	Comment
Quartz	No	Flake	Broken FI (Proximal)		0	15.9	14.3	4.9	No		Single			0					
Quartz	No	Core	Multidirectional		0	35.2	29	20.1	No			Indeterminate	6	17.8					3 platforms
Silcrete	No	Non-diagnostic			0	43.9	25.8	7.1	No					0					
Quartz	No	Flake	Broken FI (Proximal)		0	19.8	11.9	6.7			Single			0					
Quartz	No	Flake Shatter			0	27.2	18.7	8.2	No					0					
Quartz	No	Flake	Broken FI (Proximal)		0	30.8	21.4	14.5	No		Single			0					
Quartz	No	Angular Shatter			0	29.1	22.1	10.1	No					0					
Quartz	No	Flake	Complete		0	41.4	30.4	15.5	No		Single			0					
Quartz	No	Angular Shatter			0	15.1	12.1	6.7	No					0					
Silcrete	No	Retouched Flake			0	29.5	14.6	11.2	No					0	Scraper	Complete	Flake	V-D	tula slug
Quartz	No	Flake	Broken FI (Proximal)		0	30.8	20.4	10.7	Yes		Cortical			0					
Quartz	No	Angular Shatter			0	43	26.1	16.1	No					0					

Appendix D

Testing Notification



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15 October 2021

Archaeologist
Regional Operations Group
Heritage NSW

To Whom it May Concern,

RE: Notification of archaeological test excavation program – Broken Hill Battery Energy Storage Project, Broken Hill, NSW

1.0 Introduction

In accordance with Requirement 15c of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, I am writing to inform you of a program of archaeological test excavation that is to be undertaken across Lot 7302 DP1181129 and Lot 2 DP1102040 located near Pinnacles Place, Broken Hill (the Project Area, Figure 1), scheduled to commence from the week beginning 8 November 2021.

2.0 Background

AGL Energy Limited (AGL) has received development consent to construct, operate and maintain a battery energy storage system (BESS) of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) in capacity at Broken Hill NSW (the Project). The approved location of the Project (the Site) is at two lots located at 74 to 80 Pinnacles Place, Broken Hill 2880 (Lots 57 and 58 of DP 258288). 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 also 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 submission of the environmental impact statement (EIS), TransGrid requires that AGL connect the BESS to an alternative location within the substation (Figure 1). This alternative location is to the north of the one previously identified in the EIS. To avoid the transmission line crossing existing overhead transmission lines, it is proposed to be installed underground between the Site and the TransGrid Broken Hill substation. The underground transmission line will be subject to detailed design and is proposed to:

- be constructed by excavating an approximately 600 mm wide trench using a rubber tracked mini excavator or similar to minimise environmental impacts;
- require a disturbance footprint approximately 4 m wide; and
- involve the installation of two x 3-phase cables that would be protected in the area crossing the ephemeral drainage line.

To accommodate the revised transmission alignment, a modification application will be required in accordance with Section 4.55(2) of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*.

3.0 Proponent & Archaeologist Details

The Proponent for the Project is AGL Energy Limited (Level 24, 200 George Street, Sydney NSW 2000). The project contact at AGL is Natalie Leighton (NLeighton@agl.com.au). AECOM archaeologist Geordie Oakes will manage the test excavation program. Contact details for Geordie are as follows:

Office address: AECOM Australia Pty Ltd, Level 6, 420 George Street, Sydney, NSW 2000

Mobile: 0410513509

E-mail: geordie.oakes@aecom.com

4.0 Project Area

The Project Area for the modification application, as shown on Figure 1, comprises the new underground transmission line alignment between the Site and the TransGrid Broken Hill substation.



Land within the Project Area is generally undisturbed and not in use, with the exception of various dirt access roads.





5.0 AHIMS Search

The AHIMS database, administered by Heritage NSW, contains records of all Aboriginal objects reported to the Director General of the Department of Premier and Cabinet in accordance with Section 89A of the *National Parks and Wildlife Act 1974*. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database undertaken on 15 December 2020 for a 10 x 10 km area centred on the Project Area, extending 5 km to the north, south, east and west, resulted in the identification of 50 Aboriginal sites, comprising 40 open artefact sites (i.e., isolated artefacts and artefact scatters), seven stone quarries (two with associated artefacts), two hearths and one resource and gathering site (**Table 1**).

Consideration of the location of previously recorded Aboriginal sites indicates that no previously recorded Aboriginal sites are located wholly or partially within the Project Area. The closest site – open artefact site "Kanandah 1" (AHIMS #23-4-0640) is located around 390 m to the south of the Project Area.

Table 1 Site search results (10 x 10 km area)

Site Type	Count	% site type
Open artefact site (i.e., isolated artefacts and artefact scatters)	40	80
Stone quarry	7	14
Hearths	2	4
Resource and gathering site	1	2
Total	50	100

6.0 Archaeological Test Excavation Program - Sampling Strategy, Post Excavation Analysis and Artefact Storage

A program of archaeological test excavation will be completed within the Project Area. For the current assessment, it is proposed that test pits be placed at 20 m intervals along the transmission line corridor resulting in approximately 17 test pits being excavated (Figure 1). Test pits will be hand excavated in 0.25 m² (i.e., 50 x 50 cm) units and will be dry sieved through a 5 mm mesh to a maximum depth of 1.2 m.

All subsurface testing will be carried out in accordance with Requirement 16a, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). Results from the data will be used in conjunction with survey results to inform management recommendations included in an ACHAR prepared in accordance with Requirement 11 of the Code of Practice. Aboriginal objects recovered during subsurface testing will be curated in accordance with Requirement 26 of the Code of Practice.

Any Aboriginal objects recovered from the test excavations will be retained by AECOM at their office at 420 George St, Sydney 2000 until completion of recording and analysis. Details of any proposed keeping place for recovered artefacts will be provided in the Aboriginal Cultural Heritage Assessment Report.

Should you require any additional information regarding the test excavation program detailed above please feel free to contact me.

Yours faithfully,



A handwritten signature in black ink, appearing to read 'G. Oakes'.

Geordie Oakes
Archaeologist
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Appendix E

Test Pit Descriptions

Test Pit Details	Landform	Stratigraphy	Watercourse name	Distance to Water (m)	Nearest Stream Order	No. of Aboriginal artefacts	Other Inclusions
Test Pit #: 1 E: 539891 N: 6461012	Level	0-16 cm: Dry Light Red Brown Sandy Silty Loam 16 cm: Dry Dark Red Brown Silty Clay Loam	Kellys Creek	54	1 st order	0	Gravel Very fine pebbles
Test Pit #: 1a E: 539883 N: 6461008	Level	0-4 cm: Dry Red Brown Sandy Silty Loam 4-11 cm: Dry Dark Red Brown Silty Clay Loam 11-19 cm: Grey Sandy Loam	Kellys Creek	46	1 st order	0	Roots Gravel
Test Pit #: 2 E: 539873 N: 6461003	Level	0-7 cm: Dry Light Red Brown Silty loam 7-16 cm: Dry Dark Red Brown Silty Clay Loam	Kellys Creek	33	1 st order	0	Roots Gravel
Test Pit #: 2a E: 539865 N: 6460999	Level	0-9 cm: Dry Light Red Brown Silty loam 9-13 cm: Dry Dark Red Brown Silty Clay Loam	Kellys Creek	23	1 st order	0	Roots Gravel
Test Pit #: 3 E: 539855 N: 6460995	Level	0-14 cm: Dry Red Brown Sandy Clay Loam 14-21 cm: Dry Dark Red Brown Silty Clay Loam	Kellys Creek	14	1 st order	0	Roots Gravel
Test Pit #: 3A E: 539845 N: 6460995	Level	0-19 cm: Dry Light Red Brown Sandy Silty Loam 19 cm: Dark Red Brown Silty Clay Loam	Kellys Creek	5	1 st order	0	Roots Gravel
Test Pit #: 4 E: 539835 N: 6460994	Level	0-36 cm: Light Red Brown Silty Sandy Loam 36 cm: Dark Red Brown Silty Clay Loam	Kellys Creek	3	1 st order	0	Roots Gravel
Test Pit #: 4A E: 539827 N: 6460993	Level	0-36 cm: Light Red Brown Sandy Silty Loam 36 cm: Dark Red Brown Silty Clay Loam	Kellys Creek	11	1 st order	0	Roots Gravel Insects
Test Pit #: 5 E: 539816 N: 6460992	Level	0-1 cm: Light Red Brown Sandy Silty Loam 1-9 cm: Dark Red Brown Silty Clay Loam	Kellys Creek	22	1 st order	0	
Test Pit #: 5A E: 539808 N: 6460992	Level	0-5 cm: Light Red Brown Sandy Silty Loam 5-12 cm: Dark Red Brown Silty Clay Loam	Kellys Creek	29	1 st order	0	Roots Gravel

Appendix F

Site Card

excluded from exhibited version of this report