AGL Energy Limited
21-May-2021

Broken Hill Battery Energy Storage System Project

Environmental Impact Statement

Environmental Impact Statement

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Client: AGL Energy Limited

ABN: 74 115 061 375

Prepared by

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Declaration

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

Environmental assessment prepared by

Role	Project Director	Project Manager	EIS Author	EIS Author	EIS Author
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Applicant and land details

Applicant	AGL Energy Limited
Applicant address	Level 24, 200 George Street, Sydney NSW, 2000
Proposal	AGL Energy Limited (AGL) is seeking development consent to construct, operate and maintain a Battery Energy Storage System (BESS) with a capacity of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) (the Project). The Project would provide a range of network services to augment the reliability of energy supply at Broken Hill. The Project would also provide storage and firming capacity to the National Energy Market as well as additional services to assist grid stability including frequency control ancillary services.
Land to be developed	The proposed location of the BESS is on two lots at 74 to 80 Pinnacles Place, Broken Hill, 2880 (Lots 57 and 58 of DP 258288). The Project would also involve the installation of an overhead transmission connection between the Site and the TransGrid Broken Hill substation, which would traverse Commons. The proposed transmission line corridor would cross two land parcels: • Lot 7302 DP 1181129; and • Lot 2 DP 1102040 (the same lot that contains the substation).

Environmental Impact Statement

This EIS assesses the environmental impacts of this Project and includes the matters referred to in Secretary's Environmental Assessment Requirements provided to the Applicant on 23 December 2020 under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.

Declaration

I certify that the contents of the EIS, 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: 21st May 2021

Name: William Miles CEnvP IA

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Glossary and Abbreviations

Term/Acronym	Description
AADT	Annual average daily traffic
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHMPs	Aboriginal Cultural Heritage Management Plans
AECOM	AECOM Australia Pty Ltd
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Possibility
AGL	AGL Energy Limited
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
Airports Act	Airports Act 1996 (Commonwealth)
ALARP	As low as reasonably practicable
ALR Act	Aboriginal Land Rights Act (NSW)
APZ	Asset Protection Zone
ARPANZA	Australian radiation Protection and Nuclear Safety Agency
ARR	Australian Rainfall and Runoff
ARTC	Australian Rail Track Corporation
ATSIHP Act	Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)
AVTG	Assessing Vibration: A Technical Guideline
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCD	Biodiversity and Conservation Division
BDAR	Biodiversity development assessment report
BESS	Battery Energy Storage System
BFCC	Bush Fire Coordinating Committee
BHLALC	Broken Hill Local Aboriginal Land Council
BHP	Broken Hill Propriety Company Ltd
Broken Hill LEP	Broken Hill Local Environmental Plan 2013
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CEMP	Construction Environmental Management Plan
CHL	Commonwealth Heritage List
CIV	Capital investment value
CLM Act	Contaminated Land Management Act 1997 (NSW)
CML	Consolidated Mining Lease
CM Act	Commons Management Act 1989 (NSW)
CNVMP	Construction Noise and Vibration Management Plan
COAG	Council of Australian Governments

Term/Acronym	Description
CoPC	Contaminants of potential concern
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSP	Community Strategic Plan
Cth	Commonwealth
CTMP	Construction Traffic Management Plan
DA	Development application
DAWE	Department of Agriculture, Water and the Environment
dB	Decibel
dB(A)	A-weighted decibels
DCP	Broken Hill Development Control Plan 2016
DEC	Department of Environment and Conservation
DECC	Department of Energy and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEM	Digital Elevation Model
DER	Distributed energy resources
DP	Deposited plans
DPIE	Department of Planning, Industry and Environment
DSI	Detailed Site Investigation
EESG	Environment, Energy and Science Group
EIS	Environmental Impact Statement
EL	Exploration licence
EMF	Electromagnetic fields
ENM	Excavated natural materials
EOI	Expressions of interest
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
EPA	Environment Protection Authority
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically sustainable development
ETMHC	Electricity Transmission Ministerial Holding Corporation
FTE	Full Time Equivalent
GHG	Greenhouse gasses
GSNSW	Geological Survey of NSW
HIPAP 6	Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis
HTW	High threat weed
HV	High voltage

Term/Acronym	Description
HVAC	Heating, ventilation and air condition
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICOMOS	International Council on Monuments and Sites
ILUA	Indigenous Land Use Agreements
IPA	Inner Protection Area
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
ISP	Integrated System Plan
km	kilometres
kV	Kilovolt
LALC	Local Aboriginal Land Council
LEPs	Local Environment Plans
LGA	Local Government Area
Li-ion	Lithium-ion
LSPS	Local Strategic Planning Statement
m	Metres
MEG	Mining, Exploration & Geoscience
MNES	Matters of National Environmental Significance
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
MV	Medium voltage
MW	Megawatts
MWh	Megawatt-hour
NEM	National Energy Market
NHL	National Heritage List
NML	Noise management level
NPfI	Noise Policy for Industry
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NRAR	National Resources Access Regulator
NSW	New South Wales
NSW Trade and Investment, 2013	NSW Renewable Energy Action Plan
NSWALC	NSW Aboriginal Land Council
NT Act	Native Title Act 1993
NTSCORP	Native Title Services CORP
OEH	Office of Environment and Heritage
OSD	On-site detention
PAD	Potential Archaeological Deposit
PBP	Planning for Bush Fire Protection
PCT	Plant Community Type
PHA	Preliminary hazard analysis

Term/Acronym	Description
PIRMP	Pollution Incident Response Management Plan
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
RAP	Registered Aboriginal Party
RBL	Rating background level
Regional Plan	Far West Regional Plan
RFS	Rural Fire Service
RMS	Roads and Maritime Services
RNE	Register of the National Estate
RNP	Road Noise Policy
Roads Act	Roads Act 1993
ROL	Road Occupancy Licenses
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP 33	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
SEPPs	State Environmental Planning Policies
SHR	State Heritage Register
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State Significant Development
SSDA	State Significant Development Application
TCP	Traffic Control Plan
TfNSW	Transport for New South Wales
the Finkel Review	Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future
The Strategy	Transmission Infrastructure Strategy 2018
TMP	Traffic Management Plan
TRH	Total recoverable hydrocarbons
TSP	Total suspended particles
VENM	Virgin excavated natural materials
VPP	Virtual power plant
VRE	Variable renewable energy
WHL	World Heritage List
WM Act	Water Management Act 2000 (NSW)
WSUD	Water-sensitive urban design

Executive summary

Overview

AGL Energy Limited (AGL) is seeking development consent to construct, operate and maintain a Battery Energy Storage System (BESS) with a capacity of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) (the Project). The Project would provide a range of network services to augment the reliability of energy supply at Broken Hill. The Project would also provide storage and firming capacity to the National Energy Market (NEM) as well as additional services to assist grid stability including frequency control ancillary services.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, this Environmental Impact Statement (EIS) has been prepared in accordance with the relevant provisions of the EP&A Act. It has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning, Industry and Environment (DPIE) on 23 December 2020 and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation).

In accordance with Division 5.1 of the EP&A Act, this EIS presents an assessment of the potential environmental issues identified during the planning and assessment of the Project. The assessment considers the areas directly or indirectly affected by construction and operation of the Project, as relevant to each environmental or social matter considered.

The Project

The proposed location of the BESS (the Site) is on two lots at 74 to 80 Pinnacles Place, Broken Hill, 2880 (Lots 57 and 58 of DP 258288). The Project would also involve the installation of an overhead transmission connection between the Site and the TransGrid Broken Hill substation, which would traverse Lot 7302 DP1181129. The Site and the transmission line corridor constitute the 'Project Area'. The Project Area, Site and key features of the Project are shown in **Figure E- 1**.

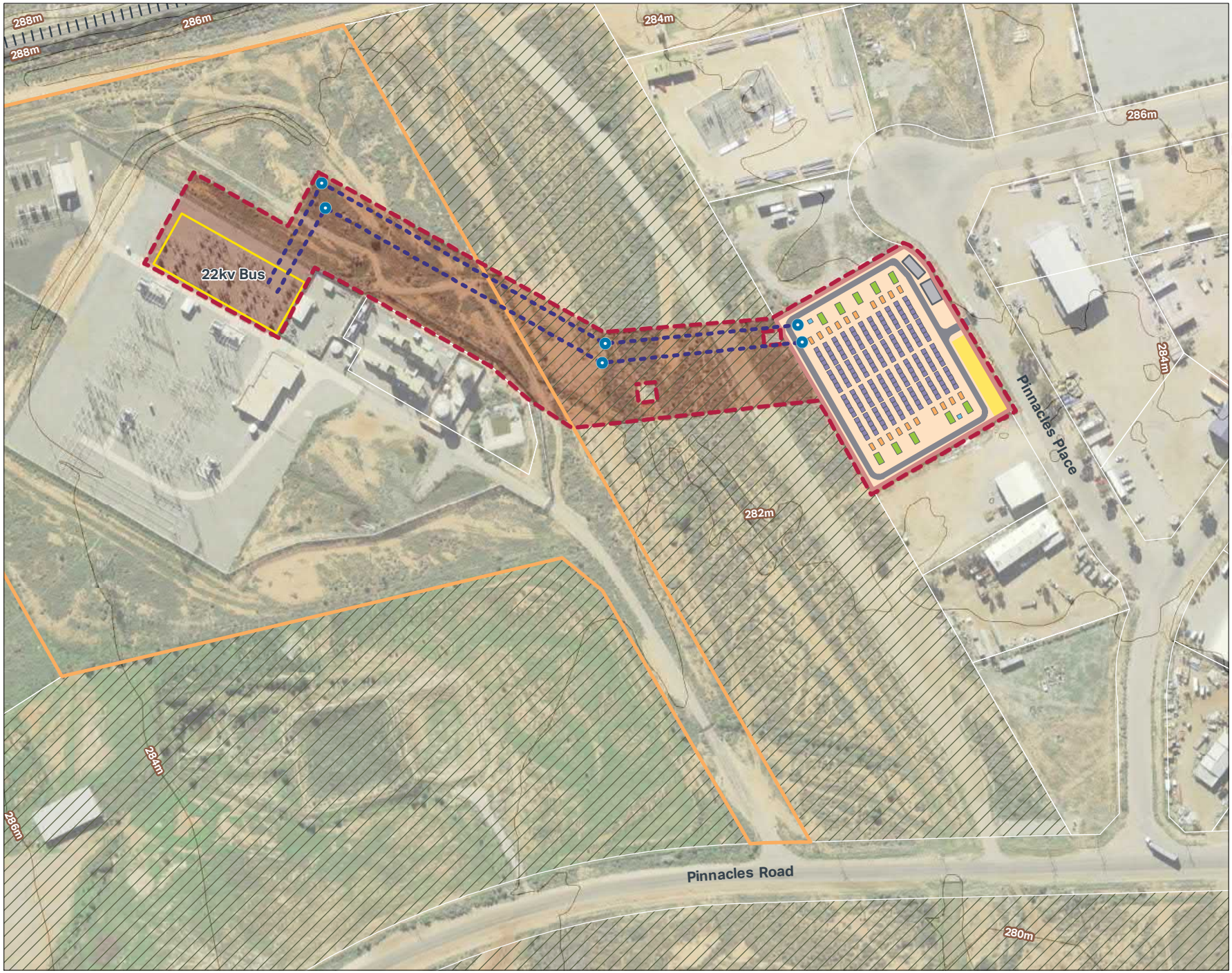
Key features of the Project would include:

- Construction and operation of a BESS of a nominal capacity of approximately 50 MW and up to 100 MWh
- Connection of the BESS to the nearby TransGrid substation via a 22 kV overhead powerline connecting through a 22 kV busbar in the substation.

Key components of the Project would include:

- 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 TransGrid Broken Hill Substation
- Temporary site office and then a permanent control and office building
- Asset Protection Zone (APZ)
- Site access, internal roads and car parking
- Drainage and stormwater management
- Other ancillary infrastructure including security fencing, lighting and CCTV.

Construction of the Project is intended to commence late 2021 and take approximately 12 months to complete.



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Legend

- Project Area
- Site
- TransGrid Broken Hill Substation
- 22kV Bus
- Commons
- Railway
- Contour
- Indicative overhead transmission line
- Indicative transmission line pole

Site features

- Office building
- Battery
- Inverter
- Medium voltage auxillary switchboards
- Transformer
- Laydown area/operational parking area
- Access road
- Permeable surface

FIGURE E-1:
PROJECT AREA LAYOUT

Source: © Department of Customer Service 2020

Consultation

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 feasibility, planning and development phases of the Project. AGL will continue to inform the local community and stakeholders at key milestones as the Project progresses, with the aim to demonstrate commitment to transparency and accountability.

A community and stakeholder engagement plan (CSEP) developed by AGL (2020) for the Project, outlines the following strategic approach being adopted during consultation:

- Be open and transparent
  - Allows key stakeholders an opportunity to provide comment and raise issues important to them
- Consult with the community and stakeholders on key decisions
  - Invite key stakeholders to contribute their views on the Project and feed into the decision-making process
- Be accountable for developing trusting relationships with the community and other stakeholders
  - Maintaining accountability will allow for more meaningful feedback from the community.

AGL has consulted with and will continue to consult with the community and key stakeholders using traditional and social media, meetings, website and project updates, and the distribution of fact sheets.

The EIS will be placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period community members and stakeholders have the opportunity to submit feedback to DPIE.

Environmental assessment

Biodiversity

A Biodiversity Development Assessment Report (BDAR) has been prepared for the Project. This was supported by fieldwork and assessed impacts relevant to both the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

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.

Construction of the Project would involve the removal of approximately 0.27 hectares of low condition native vegetation (Plant Community Type (PCT) 155) from the Site. Another 0.55 hectares of low condition native vegetation (PCT 155) occurs along the transmission line corridor which has a buffer of 20 metres. The proposed transmission line would not impact all of this area and the majority of this vegetation would be retained. However, the final location of the transmission line supporting structures may result in a small loss of this PCT.

One threatened fauna species listed under the EPBC Act has a moderate likelihood of occurrence in the Project Area due to an association with PCT 155: the 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 it is highly unlikely to occur within the Project Area and be impacted by the Project, given the limited records of this species in this vegetation type, the degraded state of the Project Area, and the absence of tracks or burrows.

No threatened biodiversity at risk of Serious and Irreversible Impacts are known or considered likely to occur in the Project Area or would be impacted by the Project.

A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the Project has been undertaken using the Biodiversity Assessment Method Calculator (BAM-C) (version 1.3). The calculation concluded that a total of 17 credits would be required to offset ecological impacts associated with the Project.

Direct and indirect impacts are proposed to be mitigated primarily through project design, as well as management and mitigation measures, including offsetting.

Aboriginal heritage

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

Survey within the Project Area, alongside Registered Aboriginal Parties (RAPs), identified a predominately disturbed landscape where topsoils have been graded and levelled. RAPs did not disclose any Aboriginal cultural values for the Project Area. However, all commented on the heavily disturbed nature of the Project Area.

Based on an observation of historic disturbances and landscape variables, the subsurface sensitivity of the Project Area was assessed as low. No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey.

During the survey, RAPs identified two lithic items within the Project Area which they considered might potentially be artefacts. While neither item satisfies technical criteria for identification as a stone artefact, as a precautionary measure, both were moved to areas excluded from the Project Area by attending RAP field representatives.

Given that the Project Area excludes the locations of the lithic items, neither item would be impacted by the construction or operation of the Project. Management and mitigation measures would be implemented to manage impacts to previously unidentified Aboriginal objects, should they be encountered.

Non-Aboriginal heritage

One historic heritage item is present within the Project Area - the City of Broken Hill, which comprises the entire Broken Hill City Council Local Government Area (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 and the planned design and landscaping of the town. No other historic heritage items were identified within or in the immediate vicinity of the Project Area. The closest individually listed heritage item is located about 760 metres to the south-east of the Project Area (Old Broken Hill City Abattoir, an item of local significance listed under Schedule 5 of the Broken Hill Local Environmental Plan 2013).

The Project Area is located in an existing industrial area outside of the Broken Hill city centre. As such, construction or operation of the Project 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 Project Area, visual impacts to the listing would also be negligible.

Management and mitigation measures would be implemented to manage potential impacts in the event that unexpected historical archaeological relics are identified during construction; however, this is considered unlikely to occur.

Soils, groundwater and contamination

A Detailed Site Investigation (DSI) and Assessment Report has been prepared for the Project to identify contaminants of potential concern, inform future development works and understand requirements for further assessment and/or management. The DSI and Assessment Report involved a soil investigation which included drilling six boreholes across the Site to identify the potential presence of groundwater, and collecting and analysing soil samples for contaminants of potential concern.

Ground disturbance

Ground disturbance works during construction would include minor earthworks. Within the transmission line corridor, there would be an up to three metre footing for the transmission line poles. Potential impacts would be manageable through erosion and sediment controls implemented during construction.

Soils and contamination

During investigations, no asbestos was detected in the fragment samples collected or in the soil samples analysed. All soil samples reported concentrations of the contaminants analysed below the adopted human health and ecological assessment criteria for commercial industrial land use, with the exception of a small spill from an intermediate bulk container. In this location, hydrocarbon odour and staining of soil was observed. The DSI and Assessment identified that there are potentially complete pathways from direct contact with localised petroleum hydrocarbon impacted surface soils by on-site commercial and intrusive maintenance workers and ecological receptors within the vicinity of the intermediate bulk container. This potential contamination risk would be mitigated through the preparation of a Remedial Action Plan for the excavation of impacted soils within the vicinity of the intermediate bulk container.

Accidental spills and leaks of fuels and oils from plant and equipment during construction would potentially result in unintentional contamination on-site and the potential for additional contamination to mobilise off-site. However, with the implementation of site management controls, the risk of accidental spills and leaks occurring during construction would be low.

The operation of the Project is not anticipated to result in contamination impacts to the Project Area. Operations would be carried out in accordance with maintenance protocols for the Site.

Groundwater

Groundwater was not encountered during field investigations, which involved drilling up to eight metres below ground level. Given that ground disturbance works during construction would be up to three metres below ground level, and only in limited locations, it is unlikely that groundwater would be intercepted by the Project. There would also be no changes to infiltration rates anticipated during construction. Therefore, the proposed construction works are not anticipated to result in impacts to groundwater.

During operation, there would be an increase in impermeable surfaces at the Site. This would potentially reduce the area where infiltration to groundwater could occur. Potential groundwater impacts would be managed through installing a surface water management system for the Project, which allows for surface water to leave the Site in a controlled manner, and then infiltrate into local groundwater.

Noise and vibration

A noise and vibration assessment has been undertaken to assess the potential noise and vibration impacts during construction and operation of the Project.

The construction of the Project is predicted to generally comply with the noise management levels at non-residential receivers, with some minor exceedances predicted to occur. These exceedances would generally be within the 1-10 dB exceedance band and are therefore considered a minor impact. Exceedances greater than 10 dB would be experienced by a small number of non-residential receivers during the day. These impacts would be temporary in nature, with the construction of the Project planned to commence in late 2021 and be completed in late 2022. No exceedances are predicted to occur at residential receivers during construction and operation of the Project.

With the implementation of minimum working distances of high impact items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. The separation distance between the Project Area and the nearest potentially affected receivers is sufficient for vibration levels to be compliant with both the human comfort and cosmetic damage criteria.

Taking into consideration the existing traffic volumes on the Barrier Highway, construction traffic to the Project Area is predicted to increase noise levels by less than 1 dB. Therefore, the potential traffic noise impact on residential receivers would be negligible and not noticeable.

During operation of the Project, predicted noise levels under both standard and noise enhancing meteorological conditions would comply with day, evening and night-time project noise trigger levels at all receivers. Therefore, noise impacts to receivers during operation of the Project would be negligible. Given the low operational traffic proposed, potential operational traffic noise impact would be negligible.

Overall, potential noise and vibration impacts of the Project would be limited and manageable with the implementation of standard mitigation measures. A Construction Noise and Vibration Management Plan (CNVMP) would be prepared to manage potential impacts during construction.

Transport and access

A traffic and access impact assessment has been undertaken for the Project to assess potential transport impacts during construction and operation of the Project.

Traffic generated by construction vehicles, including construction trucks and construction workers, is expected to be low given the nature of the construction of the Project, and would likely fluctuate depending on the Project construction stage. During peak construction periods, up to 50 light vehicles and 20 heavy vehicles are anticipated to access the Project Area per day. On a typical day, around two heavy vehicles would access the Project Area during peak hours. As such, it is expected that traffic impacts generated from construction traffic would be negligible.

During construction, there is potential for some short-term localised impacts to occur at the access to the Site from Pinnacles Place in the form of delays with road users. These potential impacts would be temporary and localised, and likely only affect one road user at a time due to the low traffic levels on Pinnacles Place. The Project may also result in a minor impact to car parking availability on Pinnacles Place in the section immediately fronting the Site due to the use by construction workers for parking.

Property access to neighbouring properties would be maintained at all times. The Project is also not anticipated to result in impacts to the public transport or active transport network.

During operation, traffic generation would be low (up to three light vehicles per day), resulting in limited impacts on the road network surrounding the Project. Car parking spaces would be provided within the Site. As such, potential transport and access impacts during operation would be negligible.

Potential impacts would be manageable with the implementation of management and mitigation measures, including the preparation of a Construction Traffic Management Plan (CTMP).

Surface water, flooding and water use

A stormwater assessment has been undertaken for the Project to assess potential impacts relating to surface water. Potential impacts related to flooding and water use have also been discussed.

During construction, some works, including earthworks, have the potential to impact overland flow paths moving through the Project Area resulting in the minor redistribution of some surface flows. The redistribution and increase of flows during construction is not expected to affect the performance of downstream drainage infrastructure. Management and mitigation measures would be implemented to appropriately control stormwater flows.

The Site is not likely to be impacted by flooding events up to and including a 1% annual exceedance probability (AEP) storm event. As such, the construction works within the Site are not likely to impact on flood behaviour. Construction works within the wider Project Area (i.e. Lot 7302 DP1181129 have the potential to interact with flood waters. While the drainage line is generally dry most of the year, there is potential for the upstream catchment to generate large flows during a high intensity rainfall event which would be directed to the ephemeral drainage line and could result in flooding along the drainage line. Given that works along the transmission line corridor would be short term, it is considered unlikely that a flood event along the ephemeral drainage line would coincide with construction works.

Some construction works, such as earthworks, vehicle movements across the Project Area, and dewatering open excavations following periods of rainfall (which may contain sediments and other pollutants mobilised by rainfall), could potentially result in a low quality of stormwater runoff leaving the Project Area and entering receiving watercourses. However, with the implementation of a soil and water management plan in accordance with the Blue Book (Landcom, 2004), impacts to receiving watercourses would be negligible.

During operation, the Project would increase the impervious area at the Site which, subject to the final site layout, would increase the runoff generated by the Site. Any material increase in runoff and changes to the overland flow patterns would be managed through formalised stormwater system(s) at the Site.

To manage the risks of flooding at the Site during operation, the office buildings and concrete pads for supporting the inverters, transformers and batteries would be elevated above the ground (on concrete pads) to protect them from potential floodwater impacts. The internal road network would also direct floodwaters away from the battery and electrical infrastructure.

Operational water quality impacts to the receiving watercourse are likely to be negligible with proposed stormwater management measures in place.

Bushfire

A bushfire threat assessment has been undertaken for the Project to assess potential bushfire risk. The potential risk to the Project Area and potential risk of fire spreading to external assets from the Project Area has been considered. Both risk scenarios are anticipated to result in a low risk of bushfire impact. This can be attributed to the following factors:

- There is no significant history of landscape-wide fire within the Project Area or surrounding area; therefore, the likelihood of a fire occurring would be considered unlikely
- The fuel and slope parameters of the Site and surrounding area would not result in high intensity fires or high residence time
- The Project would be a non-habitable development
- There would be adequate opportunities for fire control along the local road and trail network
- In the event of a potential fire, the response time by fire authorities is expected to be adequate due to the presence of a nearby brigade station.

The risk of bushfire impact to the Project Area and fire initiating and spreading from the Project Area has been assessed as low. Notwithstanding, management and mitigation measures would be implemented to address residual risks. This would include the implementation of an APZ to minimize bushfire risks at the western boundary of the Site.

Hazards and risk

A Preliminary Hazard Analysis (PHA) has been prepared to assess potential hazards and risk associated with the Project.

A screening assessment was undertaken for the Project in accordance with State Environmental Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) and NSW DPIE's Hazardous and Offensive Development Application Guidelines – Applying SEPP 33 (January, 2011)). Based on the screening assessment, materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored and transported to the Site do not exceed the SEPP 33 thresholds.

A hazard identification exercise was undertaken as part of the PHA in order to identify all reasonably foreseeable hazards and associated events that may arise during the operation of the Project. A summary of the identified hazardous events included:

- Fire at the BESS e.g. from thermal runaway or electrical fault
- Loss of containment causing pollutant
- Fire and pollution at medium voltage (MV) and high voltage (HV) infrastructure
- Exposure to electromagnetic fields
- Other hazardous events including:
    - Natural hazards
    - Security breach that causes a hazardous incident
    - On-site traffic impact causes hazardous incident.

Taking into consideration the likelihood and potential consequences of these events occurring, the overall risk associated with each hazardous event range from low to moderate. However, with the implementation of proposed management and mitigation measures, the likelihood of these events occurring would be considered rare.

Other matters

Other matters considered as 'low risk' due to the nature of the Project were also assessed. The findings from these assessments concluded that:

- **Visual** – the Project would be visually compatible with the surrounding industrial area. As such, potential visual impacts associated with the construction and operation of the Project are considered low to negligible.
- **Social and economic** – the Project would result in social and economic benefits, including reduced disruption to energy supply for Broken Hill and firming of the wider transmission network. This in turn would support further renewables projects in NSW with corresponding benefits. Other economic benefits would include job creation and generation of income within the local and wider community. The Project has the potential to affect amenity as a result of changes to matters such as traffic and noise. These potential impacts would be minor and appropriately addressed through the implementation of various management and mitigation measures.
- **Waste** – with the implementation of management and mitigation measures, it is not anticipated that operational waste management activities for the Project 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 Construction Environmental Management Plan (CEMP) for the Project and would outline ways to optimise resource efficiency and waste management during construction.
- **Air quality** – taking into consideration the temporary nature of the works, the location of the Site within an industrial zone, and the distance to residential receivers, air quality impacts during the construction and operation are not considered to be significant and would be manageable through the CEMP which would be prepared for the Project.
- **Cumulative impacts** –taking into consideration the minor residual environmental impacts of the Project, following the implementation of management and mitigation measures, there would be limited potential for cumulative environmental impacts to occur with other projects in the region.

Conclusion

This EIS has been prepared in accordance with the relevant provisions of the EP&A Act. It has been prepared to address the SEARs issued by the Secretary of the DPIE on 23 December 2020 and the relevant provisions of Schedule 2 of the EP&A Regulation.

The EIS provides a comprehensive assessment of the Project and its relevant environmental, social and economic issues, both for the Project alone and cumulatively. Potential impacts have been assessed and strategies to avoid, minimise and mitigate those impacts have been identified.

The Project would deliver several benefits. In particular, the Project would deliver critical energy infrastructure that would benefit Broken Hill and support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region.

Based on the findings detailed within this EIS, the Project is considered to be justified and is recommended to proceed subject to Ministerial approval being granted.

1.0 Introduction

1.1 Project overview

AGL Energy Pty Ltd (AGL) is seeking development consent to construct, operate and maintain a Battery Energy Storage System (BESS) with a capacity of approximately 50 megawatts (MW) and up to 100 megawatt-hour (MWh) (the Project). The Project is in the suburb of Broken Hill, which is part of the Broken Hill City Council's Local Government Area (LGA) (refer to **Figure 1-1**).

The Project would support the reliable supply of electricity to Broken Hill in the event of line failure and provide efficient grid support for the region. The Project would also provide storage and firming capacity to the National Energy Market (NEM) as well as additional services to assist grid stability, including frequency control ancillary services.

The proposed location of the BESS (the Site) is on two lots at 74 to 80 Pinnacles Place, Broken Hill NSW 2880 (Lots 57 and 58 of DP 258288). The Site is located approximately 120 metres east of the TransGrid Broken Hill substation located at 76 Pinnacles Road, Broken Hill NSW 2880 (Lot 2 of DP 1102040). To connect the BESS to the substation, the Project includes the installation of an overhead transmission connection, which would traverse Lot 7302 DP1181129, being Crown Reserve. The Site and the transmission line corridor constitute the 'Project Area' (refer to **Figure 1-2**).

Key features of the Project include:

- Construction and operation of a BESS of a nominal capacity of approximately 50 MW and up to 100 MWh
- 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.

Key components of the Project would include:

- 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 TransGrid Broken Hill substation
- Temporary site office and then a permanent control and office building
- Asset Protection Zone (APZ)
- Site access, internal roads and car parking
- Drainage and stormwater management
- Other ancillary infrastructure including security fencing, lighting and CCTV.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) as it satisfies the requirements of Clause 8 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), being:

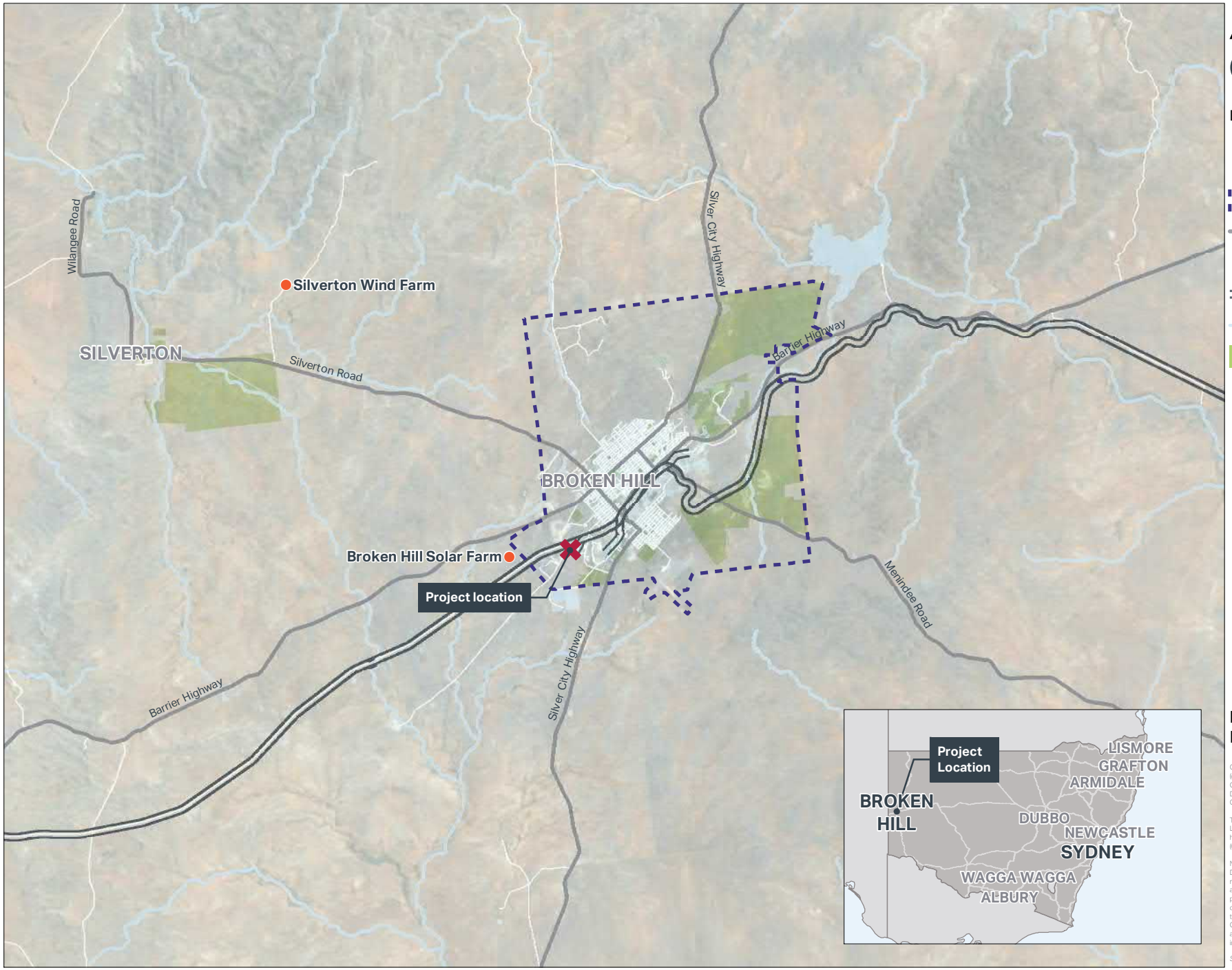
a. *The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act*

b. *The development is specified in Schedule 1 or 2 of the SRD SEPP.*

c. The 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 Site is zoned as IN1 – General Industry 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 overhead electrical transmission line connecting to 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 capital investment value (CIV) for the Project is estimated at $80 million, the Project is classified as SSD.



AECOM

N

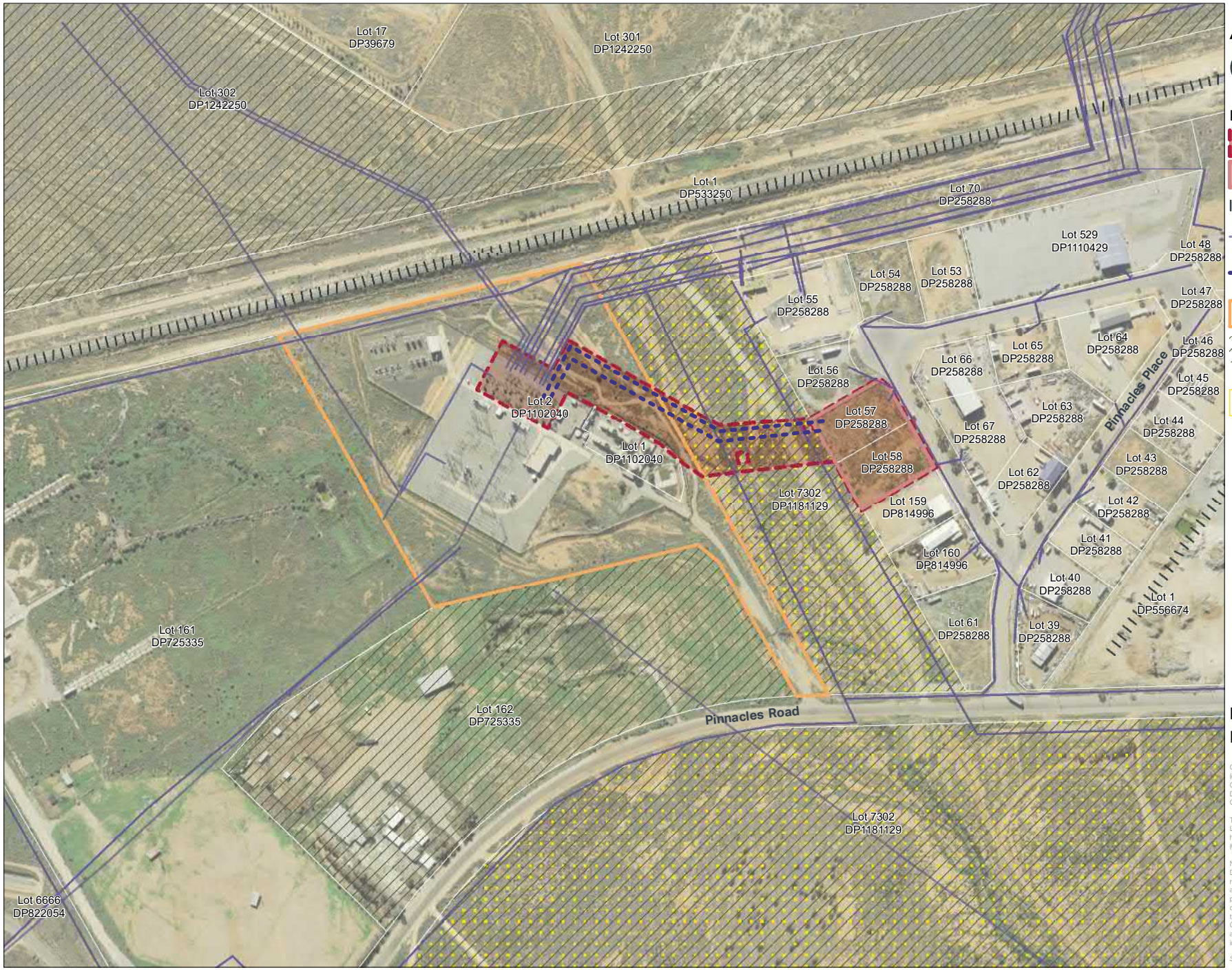
0 3 6 km

Legend

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

FIGURE 1-1:
PROJECT CONTEXT

Source: © Department of Customer Service 2020



AECOM

N

0 50 100 m

Legend

- Project Area
- Site
- Railway
- Existing transmission lines
- Indicative overhead transmission line
- TransGrid Broken Hill substation
- Commons
- Land subject to Local Aboriginal Land Claim Claim number: 40469 (Lot 7302/DP1181129)

FIGURE 1-2:
PROJECT AREA LOCATION

1.2 Project objectives

The objectives of the Project are as follows:

- Provide firming capability to existing renewable projects in the Broken Hill region and throughout the NEM
- Provide islanding functionality and support a reliable electricity supply 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 the greater penetration of intermittent renewable energy.

These objectives have guided the assessment of alternatives discussed in **Section 3.3**.

1.3 The proponent

AGL operates base load, peaking and intermediate electricity generation plants supplying energy using traditional thermal generation as well as renewable sources including hydro, wind and solar. AGL employs over 8,300 people across Australia. Within New South Wales, AGL employs over 4,000 people.

AGL supplies energy and other services to almost 4.2 million customer accounts. AGL are committed to making energy, alongside other essential services, simple, fair and transparent. AGL operates the largest electricity portfolio in the NEM, made up of traditional coal and gas-fired generation, and renewables such as wind, hydro and solar. AGL also operate gas storage and production assets. AGL is focussed on developing flexible supply, building on their history as Australia's leading private investor in renewable energy, to support the transition to a new energy system. AGL are dedicated to make things better for communities, customers, the Australian economy and our planet.

1.4 Environmental impact assessment process

1.4.1 Purpose of this report

This Environmental Impact Statement (EIS) has been prepared in accordance with the relevant provisions of the EP&A Act. It has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning, Industry and Environment (DPIE) on 23 December 2020 and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation).

In accordance with Division4.7 of the EP&A Act, this EIS presents an assessment of the potential environmental matters identified during the planning and assessment of the Project (as outlined below). The assessment considers the areas directly or indirectly affected by construction and operation of the Project, as relevant to each environmental matter considered.

Alongside the applicant's community consultation and stakeholder engagement program, public exhibition of the EIS gives the community, government agencies and other interested parties an understanding of the Project and provides the opportunity to comment on the SSD application. AGL will consider this feedback in the further development of the Project and will respond to issues raised through the preparation of a Submissions Report. Further details on the assessment process for the Project are provided in **Chapter 5.0 Strategic and statutory context**.

1.4.2 Scope of the EIS

This EIS has been prepared to support a development application (DA) for the Project. The EIS provides a detailed outline of the environmental constraints, potential impacts and proposed management and mitigation measures for the Project.

In November 2020 AGL provided a Scoping Report to DPIE to request SEARs. SEARs were issued on 23 December 2020.

The SEARs identified both general requirements and key issues which must be addressed in the EIS. These key issues include:

- Biodiversity
- Heritage
- Land
- Visual
- Noise
- Transport
- Water
- Hazard and Risks
- Socio-economic
- Waste.

The SEARs also outlined requirements for consultation with relevant NSW Government agencies, other stakeholders and the community.

The SEARs as issued are presented in **Appendix A**. This appendix also shows where each requirement has been addressed within this EIS.

In addition to the SEARs, further considerations for the EIS were identified through consultation. These considerations are summarised in **Chapter 6.0 Consultation**.

The key issues identified in the SEARs and during the consultation process were assessed in line with relevant guidelines and assessment requirements. These assessments are provided or summarised in **Chapters 7.0** - **17.0** of this EIS. Where necessary, the conclusions in these chapters are supported by detailed assessments provided in Appendices C-J of this EIS.

The outcomes of these assessments have been used to identify relevant management and mitigation measures (refer to **Chapter 18.0 Management and mitigation measures**) and to justify the Project need and why it should be consented (refer to **Chapter 19.0 Project evaluation and justification**).

1.4.3 Preparation and exhibition

The objectives of this EIS are to:

- Comply with the requirements of the EP&A Act and EP&A Regulation as formalised in the SEARs
- Address the requirements of key stakeholders as identified in the SEARs and during the consultation process for the Project
- Provide DPIE with sufficient information to accept the SSD application, assess the potential environmental impacts, confirm the management and mitigation measures proposed and understand the benefits of the Project
- Inform the community about the Project.

This EIS has been prepared in accordance with the requirements outlined in clauses 6 and 7 of Schedule 2 of the EP&A Regulations, which describe the form and content required of an EIS.

1.4.4 Assessment and determination

Following exhibition of the EIS, DPIE will provide AGL with any submissions, or a summary of the submissions, received from the community or other government agencies during the exhibition period. AGL may then be required to provide a written response to the submissions that have been received, including detail on how issues raised have been addressed.

1.5 Structure of this EIS

The EIS is structured as follows:

- Executive Summary
- Chapter 1.0: Introduction to the EIS
- Chapter 2.0: A description of the Site and Project Area including location, land ownership, existing land use, surrounding land use and information on the existing operations of the existing landfill facilities and approvals
- Chapter 3.0: Contains a discussion around the options that were considered, detail and justification pertaining to the preferred option
- Chapter 4.0: A description of the Project
- Chapter 5.0: Information on the statutory framework
- Chapter 6.0: A summary of the community and stakeholder consultation that has occurred during the preparation of the EIS
- Chapter 7.0: Identification and prioritisation of environmental issues and format of assessment chapters
- Chapter 8.0: Biodiversity
- Chapter 9.0: Aboriginal heritage
- Chapter 10.0: Non-Aboriginal heritage
- Chapter 11.0: Soils, groundwater and contamination
- Chapter 12.0: Noise and vibration
- Chapter 13.0: Transport and access
- Chapter 14.0: Surface water, flooding and water use
- Chapter 15.0: Bushfire
- Chapter 16.0: Hazards and risk
- Chapter 17.0: Other matters:
    - Landscape and visual
    - Social and economic
    - Waste
    - Air quality
    - Cumulative
- Chapter 18.0: Management and mitigation measures
- Chapter 19.0: Project evaluation and justification
- Chapter 20.0: References

A number of appendices are also included as part of the EIS. The purpose of these appendices is to provide additional technical detail that supports the findings in the main body of the EIS. The appendices to this EIS include:

- Appendix A: Secretary's Environmental Assessment Requirements Response Table
- Appendix B: Biodiversity Development Assessment Report
- Appendix C: Aboriginal Cultural Heritage Assessment Report

- Appendix D: Detailed Site Investigation and Assessment
- Appendix D: Noise and Vibration Assessment
- Appendix F: Traffic and Access Impact Assessment
- Appendix G: Surface Water Assessment
- Appendix H: Bushfire Assessment Report
- Appendix I: Preliminary Hazard Analysis.

2.0 Project Area context and background

2.1 Local history and context

The Project Area is in the suburb of Broken Hill, which is part of the Broken Hill City Council LGA. Broken Hill is an inland mining city in the far west of NSW. Broken Hill 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 (refer to **Figure 1-1**). 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 a 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 the opening of a 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 underground 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 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.

2.2 Project Area and Site description

2.2.1 Project Area overview

The Project Area consists of the Site, the proposed transmission line corridor and a portion of the TransGrid Broken Hill substation.

The Site (proposed location of the BESS) has an area of approximately 0.8 hectares and is located at the eastern extent of the Project Area on Lots 57 and 58 of DP 258288. The proposed transmission line would cross two land parcels:

- Lot 7302 DP 1181129; and
- Lot 2 DP 1102040 (the same lot that contains the substation).

The TransGrid Broken Hill substation is approximately 220 metres west of the Site at 76 Pinnacles Road, Broken Hill 2880 (Lot 2 of DP 1102040).

Figure 1-2 shows the Project Area, the Site and the immediate context of the locality.

2.2.2 Usage and condition

The Site is currently used as a storage area for disused equipment, vehicles and other materials. The vegetation on the Site is in a degraded and moderate to low condition with broad areas of bare sand present and, as such, there is very limited fauna habitat.

The land that the proposed transmission line 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 (refer to **Section 5.3.8**). 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.

2.2.3 Access

The Site is accessed from Pinnacles Place, which is a sealed local road managed by Broken Hill City Council. The primary access to Pinnacles Place is from Pinnacles Road, a sealed road to the south. There are no pedestrian footpaths or crossings located on Pinnacles Place and the Site is not serviced by public transport.

The TransGrid Broken Hill substation is located at 76 Pinnacles Road. Pinnacles Road is a local road managed by Broken Hill City Council. The transmission line is accessed by an existing unsealed vehicle track, which is accessed from Pinnacles Road.

The nearest classified road is Wentworth Road/Silver City Highway (B79) located approximately 2.3 kilometres by road south east of the Site. The Silver City Highway provides a connection to the wider road network and extends to Mildura in the south. Other major roads providing connectivity to Broken Hill include the Barrier Highway (A32), providing a connection to the east through Cobar to Nyngan with further connections to the east coast cities of Sydney and Newcastle, and to the west, across the South Australian border at Cockburn to Adelaide.

Chapter 13.0 Transport and access provides more detail regarding the access routes surrounding the Project.

2.2.4 Development history

A search of the Broken Hill City Council's development application (DA) tracker for records regarding 74 – 76 and 78 - 80 Pinnacles Place, Broken Hill did not return any results. A review of the Deposited Plan (DP) 258288 indicated that the Site was created as part of a Torrens title subdivision, which was subsequently registered on 14 August 1978.

2.2.5 Ownership and consent

The Project Area is located on land zoned as IN1 General Industrial and is permissible in this location with development consent.

The Site is owned by Galena Developments Pty Ltd and Globe IBH Pty Ltd, as tenants in common. AGL has entered into an option agreement to purchase the Site.

The land that would be used for the installation of a transmission connection is freehold land that is owned by the NSW Government and is classified as Commons. Crown Lands identified Lot 7302 DP 1181129 as being a portion of the Willyama Common. Broken Hill City Council administers the Willyama Common and has been consulted regarding activities on that land. This land is also the subject of an undetermined Aboriginal Land Claim number #40469 as well as a previous Native Title Claim by the Barkandji Malyangapa People NP2020/001, which was determined on 16 June 2015. AGL has undertaken consultation with Broken Hill Local Aboriginal Land Council (BHLALC) and the NSW Aboriginal Land Council (NSWALC) regarding the Aboriginal land claim (refer to **Chapter 6.0 Consultation**).

The TransGrid Broken Hill substation is located on freehold land owned by Electricity Transmission Ministerial Holding Corporation (ETMHC) and operated by TransGrid. Prior approval from ETMHC would be sought for any works required to be undertaken within the TransGrid Broken Hill substation and should any easement(s) be required to be created then these would be negotiated and agreed with TransGrid. Discussions with these parties regarding landowner consent have taken place.

2.3 The surrounding area

2.3.1 Description of the surrounding area

The Site 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 Project 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.

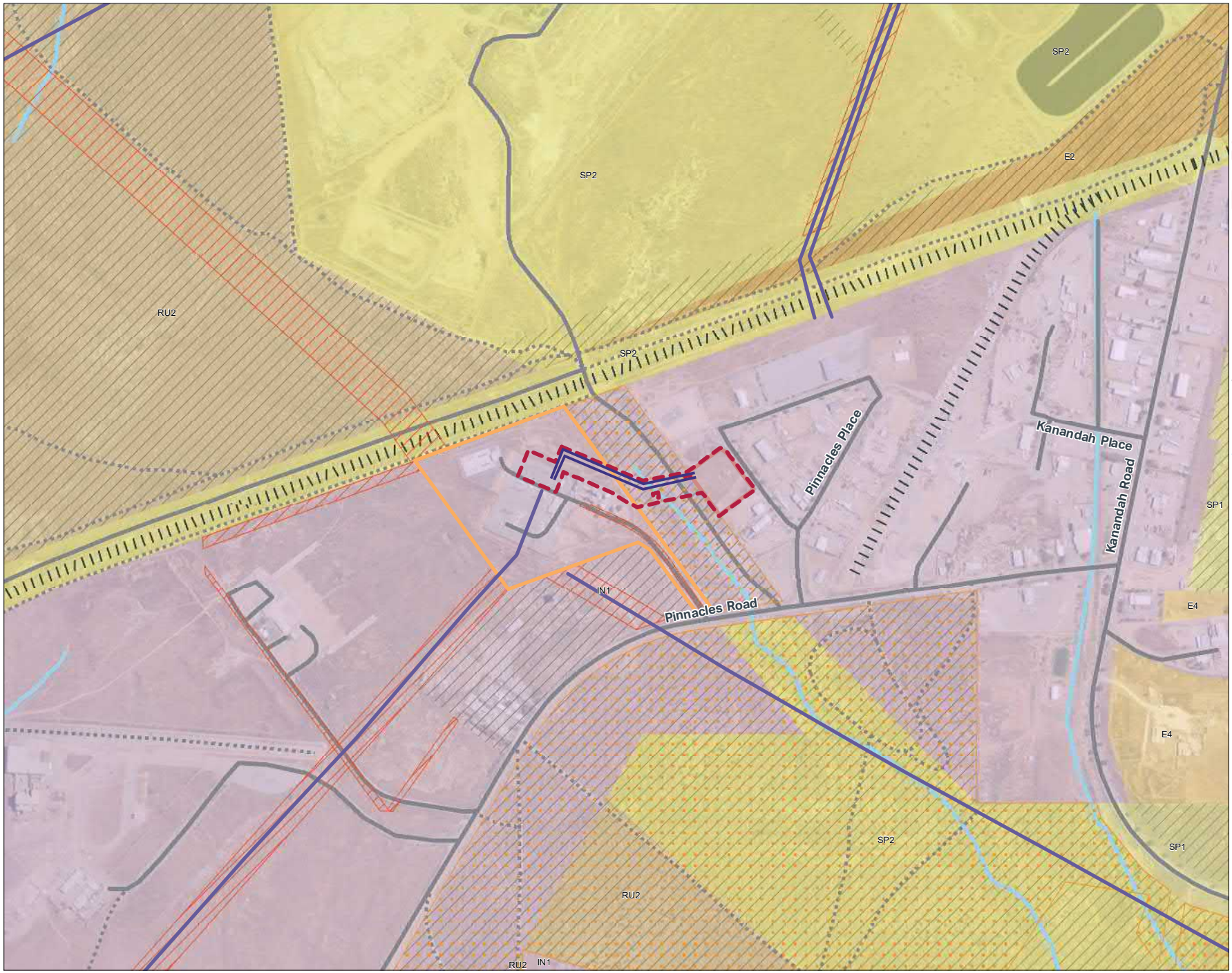
The 53 MW Broken Hill Solar Plant operated by AGL was completed in 2016 and is located approximately 1.5 kilometres west of the Project Area. At the time of construction, the Broken Hill Solar Plant was one of the largest renewable energy facilities in Australia. In addition, AGL has completed construction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

2.3.2 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 Site include:

- E2 Environmental Conservation
- E4 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).

The distribution and extent of land use zones within the vicinity of the Site are shown on **Figure 2-1**.



AECOM

N

0 100 200 m

Legend

- Project Area
- TransGrid Broken Hill substation
- Site
- Commons
- Land subject to Local Aboriginal Land Claim [Claim Number: 40469 (Lot 7302/DP1181129)]
- Existing easements
- Transmission lines
- Proposed transmission line
- Local roads
- Tracks
- Railway
- Ephemeral watercourse

Land Use Zoning

- E2 Environmental Conservation
- E4 Environmental Living
- IN1 General Industrial
- RU2 Rural Landscape
- SP1 Special Activities
- SP2 Infrastructure

FIGURE 2-1:

LAND USE ZONES SURROUNDING THE PROJECT

3.0 Project development and alternatives

3.1 Secretary's Environmental Assessment Requirements

Table 3-1 sets out the requirements as provided in the SEARs relevant to this chapter, and where they have been addressed.

Table 3-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
This EIS must include: • A detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development A strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land uses, residential development, Crown lands adjacent to the site and neighbouring industrial developments.	A detailed constraints figure has been provided (**Figure 3-1**). The strategic justification is provided in this chapter, as well as in **Chapter 19.0 Project evaluation and justification**
Land	**Where addressed**
Land – including: • An assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning.	**Section 3.5** notes the compatibility of the Project with existing land uses. This is further discussed in **Chapter 17.0 Other matters**

3.2 Project 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.

The NEM services five regions – Queensland, NSW, Victoria, South Australia, and Tasmania. It operates as a spot market to distribute electricity to homes and businesses. The role of the NEM is to provide electricity reliably and securely, which means it needs to continually meet a growing demand for a stable power source in Australian cities. At the same time, the growth in energy consumption needs to be coupled with increasing penetration of renewable sources of electricity as Australia adds to its decarbonisation and clean energy commitments. AGL has recognised the need to provide dispatchable electricity to the NEM to facilitate the increased penetration of renewable energy into the network.

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 when wind and solar resources are available respectively. 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 Project will provide storage and firming capacity to the NEM as well as additional services to assist grid stability including frequency control ancillary services.

In line with this, energy storage has emerged as a key enabler for the decarbonisation of the Australian electrical system. Energy storage allows greater penetration of intermittent renewable energy sources while maintaining network stability and security. This is aligned with the need identified by the *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future* (the Finkel Review) (Commonwealth of Australia, 2017), that the NEM requires stable, dispatchable generation to balance network requirements as renewable generation fluctuates depending on the predominate solar and wind resources available at the time.

The recent announcement of the NSW Electricity Infrastructure Roadmap and Investment Act has committed the NSW Government to support the development of five Renewable Energy Zones, intended to deliver 12GW of additional renewable capacity. This further highlights the market need for storage and firming services over the long term. The Project would play a vital role in understanding and demonstrating how grid-scale batteries are best able to support network stability and enable greater renewable integration.

The Finkel Review identified that "*Enhanced system planning will ensure that security is preserved, and costs managed, in each region as the generation mix evolves. Network planning will ensure that new renewable energy resource regions can be economically accessed*". The Council of Australian Governments (COAG) endorsed this recommendation.

The Australian Energy Market Operator (AEMO) subsequently prepared and released an Integrated System Plan (ISP) for the NEM in July 2020 (AEMO, 2020). The 2020 ISP is an actionable roadmap for eastern Australia's power system to optimise consumer benefits through a transition period of great complexity and uncertainty. It does so by drawing on extensive stakeholder engagement as well as internal and external industry and power system expertise. The ISP identifies that:

> *"Australia's energy sector faces a profound, complex and accelerating transition. As its traditional generators retire, Australia must invest in a modern energy systems with significant consumer-led distributed energy resources (DER) and utility-scale variable renewable energy (VRE), supported by sufficient dispatchable resources. Digitalised power system services must leverage advances in computing and data analytics to drive greater efficiencies and increase value to consumers and investors...*
>
> *… Historically, Australia's power system has been based on large-scale power stations located around fuel centres supplying remote load centres through large-scale transmission, which is how the physical assets that comprise the current NEM were designed and built. Now, the NEM, like other power systems around the world, is undergoing a rapid transition. On certain measures, the rate of change in Australia is the fastest of any country in the world. In this context, the ISP must set out an optimal development path for the NEM's transmission assets. It does so by optimising a power system that ranges far – both technologically and geographically – over consumer-led DER investments, storage and generation investments, and demand side responses. To optimise that system, the ISP must consider the full range of energy services required to integrate new technologies, including the vital system security services. It takes into account the capital and fuel costs of generation as well as of transmission, and opportunities for DER. It anticipates the impact of parallel shifts in coupled sectors such as transport, gas and hydrogen, and incorporates emerging innovations in consumer-owned DER, virtual power plants (VPPs), large-scale generation, energy storage and power system services."*

The Project would contribute to the storage requirements identified in the ISP. Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby placing a downward pressure on energy prices. Furthermore, battery storage technologies are anticipated to be key to the development of Renewable Energy Zones under the NSW Government's Transmission Infrastructure Strategy 2018.

Broken Hill is situated at the end of a single 250 kilometre transmission line that runs north from the border of the State of Victoria. It currently has a maximum load of approximately 60 MW. In the event of failure of the transmission line, there are two 25 MW diesel-fired gas turbines operated by Essential Energy that are used as back-up electricity generators. The recent rapid development of renewable energy projects in south-west NSW and north-west Victoria would likely result in the curtailment of renewable energy projects and increase network losses in the Broken Hill region.

AGL has recognised that the provision of an up to 100 MWh grid forming BESS could capture the otherwise spilt energy from the wind and solar farms that currently exists, and provide a reliable supply for Broken Hill, help support the existing transmission network and the broader region as a whole.

3.3 Project alternatives

Three project options were considered by AGL. These included:

- Option one (1): a base case, or 'do nothing' approach;
- Option two (2): construct a BESS in proximity to the point of energy generation; and
- Option three (3): construct a BESS in proximity to the point of energy distribution.

3.3.1 Option 1: 'do nothing'

The 'do nothing' option would involve not constructing and operating a BESS at or near Broken Hill. This option would not support existing renewables in the Broken Hill region and would not provide firming for additional renewable penetration in the NEM.

The 'do nothing' option would not meet the objectives of the Project, and therefore, was not considered a feasible option.

3.3.2 Option 2: construct a BESS in proximity to the point of energy generation

Option 2 would involve the construction of a BESS near existing renewable energy generating projects in the region, including either:

- Broken Hill Solar Plant, or
- Silverton Wind Farm.

Option 2 would result in the improved ability to capture curtailed energy from renewable projects and would provide firming capability to the existing renewable projects within the Broken Hill region. However, when compared to Option 3, Option 2 does not as effectively address the Project objective of improving the reliability of energy supply for Broken Hill and the wider region due to the limited redundancy or diversity in energy supply in the event of loss of either of the renewable energy project powerlines.. Connecting the BESS to the same infrastructure as either of the renewable projects would limit the ability to mitigate potential disruptions in energy supply, which is inconsistent with the Project objectives.

3.3.3 Option 3: construct a BESS in proximity to the point of energy distribution

Option 3 would involve the construction of the BESS at an identified site in close proximity to the existing TransGrid Broken Hill substation. Option 3 would meet the Project objectives as this option would:

- Allow for the firming capacity of renewable energy projects throughout Broken Hill and the wider region through the ability to store energy and provide it to the grid when required
- Improve the ability for the Broken Hill region to demonstrate islanding functionality and reduce reliance on the wider NEM as a result of an increased capacity for 'on-demand' energy
- Provide increased capacity to capture and utilise the curtailed energy from renewable projects throughout the region
- Provide a reliable supply of energy to Broken Hill and the wider region, reducing periods of separation from the grid as a result of energy supply disruptions.

By constructing the Project in proximity to the existing TransGrid Broken Hill substation, Option 3 would reduce disruptions to energy supply, and therefore achieve the Project objectives of enhancing the utilisation, reliability and efficiency of renewable energy use throughout Broken Hill and the wider region. As such, Option 3 is the preferred option.

3.4 Site selection

Following the identification of the preferred option, AGL identified three potential sites for the Project, as follows:

1. 74 to 80 Pinnacles Place (the Site) (Lots 57 and 58 of DP 258288)
2. Land immediately west of the Broken Hill TransGrid substation, on the western verge of Lot 2 DP 1102040
3. Land to the west of the Broken Hill TransGrid substation, on the eastern verge of Lot 161 DP 725335.

The three potential sites were assessed against the following criteria to identify a preferred option:

- Zoning of land
- Access and connection to the TransGrid Broken Hill substation
- Land requirements and ancillary infrastructure
- Environmental constraints.

Each criterion is discussed in further detail below.

3.4.1 Zoning of land

Development for the purpose of 'electricity generation works' is permissible on land with consent in a prescribed rural, industrial or special use zones in line with Division 4 of the ISEPP. The three potential sites were all located on land zoned as 'IN1 General Industrial', which is a prescribed zone under the ISEPP. Consequently, development at all three sites would constitute development that is permissible with consent under the EP&A Act.

3.4.2 Access and connection to the TransGrid Broken Hill substation

The Project would require connection to the existing TransGrid Broken Hill substation; therefore, proximity and access to the TransGrid Broken Hill substation was a key driver in identifying the preferred site. Through identifying a preferred site in close proximity to the TransGrid Broken Hill substation, opportunities for disruptions in the distribution of energy would be reduced. The three potential sites had adequate potential access to the TransGrid Broken Hill substation.

3.4.3 Land requirements and ancillary infrastructure

The minimum Site footprint was identified as being approximately one hectare for the construction of the BESS. The Project would require connection via a transmission line to the TransGrid Broken Hill substation and required good road access for construction Key to identifying the preferred site was a direct a route the proposed 22 kV transmission line that would require minimal disturbance. Therefore, as part of the AGL site selection process, the availability of adequate space to construct transmission supporting structures, including a 20 metre wide corridor for the transmission line construction, was assessed.

This screening assessment allowed the preferred option (the Site) to be identified. The Site is located on land zoned as 'IN1 General Industrial' and the Project is permissible with consent in this location. The Site is located around 200 metres east of the existing TransGrid Broken Hill substation and is separated by open, semi-vegetated land that would be suitable for the construction of a transmission line (and is currently crossed by existing transmission lines) to allow for the connection of the BESS to the TransGrid Broken Hill substation. The Site is also easily serviced by the local road network and is accessed from Pinnacles Place. Pinnacles Place and the roads leading to it are approved B-double routes which provide clearances and sufficient road widths to accommodate larger vehicles.

3.4.4 Environmental constraints

Environmental constraints were considered as part of the options discussion, with a preliminary biodiversity assessment undertaken during the site selection process. This identified that all three options could be appropriately managed through offsetting, with all vegetation mapped as Plant Community Type (PCT) 155 *Bluebush shrubland on stony rises and downs in the arid and semi-arid zones* (DPIE, 2019a). The proximity of nearby residential receptors was also considered. At a high level it was concluded that locating the Project at the Site would not result in adverse amenity impacts.

Following the choice of the Site as the preferred option, the location of the proposed transmission line corridor was workshopped to allow the medium condition PCT to be avoided.

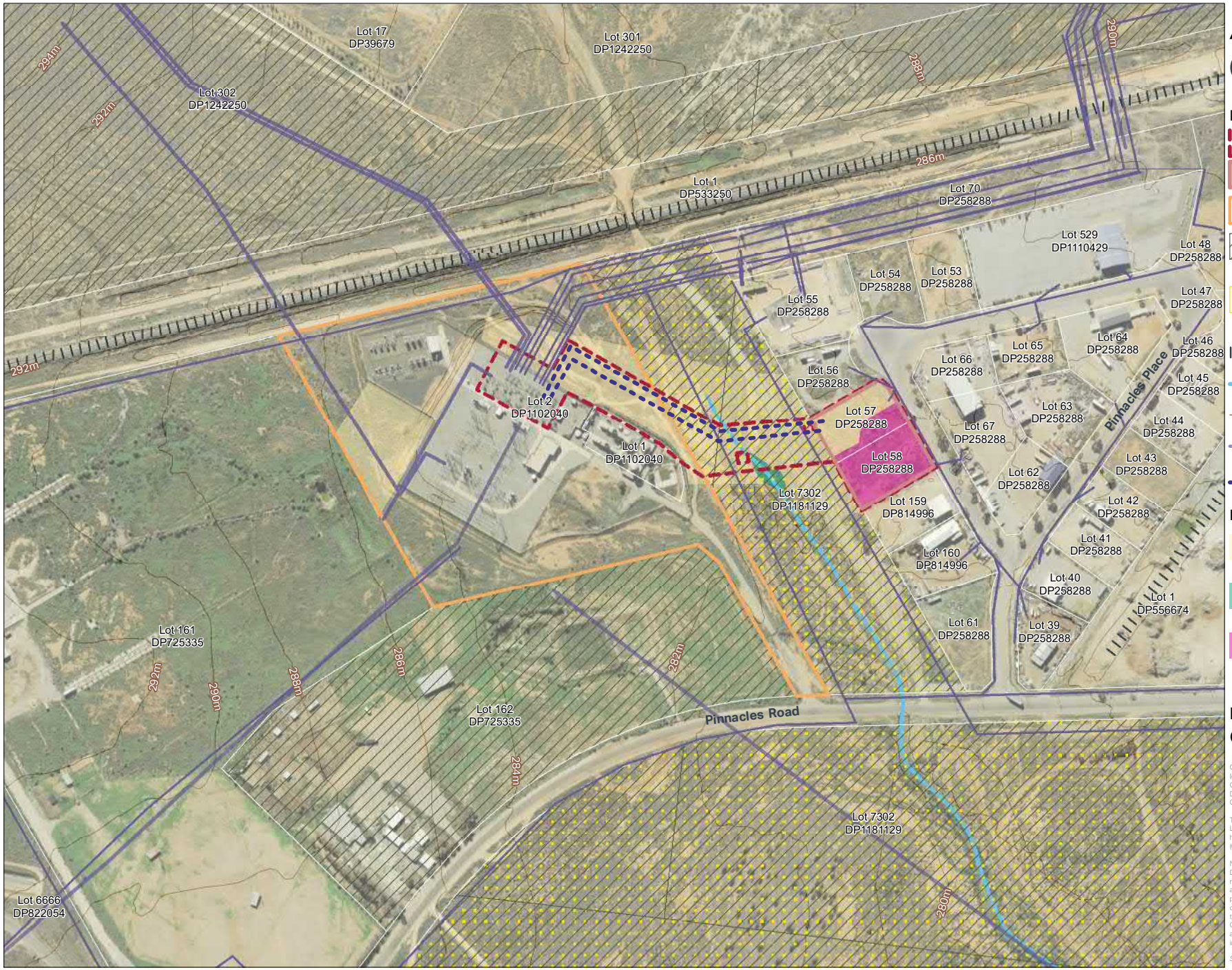
A constraints map has been prepared and provided as **Figure 3-1**.

3.5 Justification of the preferred option

The preferred option (Option 3) addresses all of the Project objectives and would support the growth of Broken Hill as an emerging renewable energy zone, by supporting a reliable electricity supply to Broken Hill.

The Project is deemed justified in this location as it would:

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



AECOM

N

0 50 100 m

Legend

- Project Area
- Site
- TransGrid Broken Hill substation
- Commons
- Land subject to Local Aboriginal Land Claim Claim Number: 40469 (Lot 7302/DP1181129)
- Railway
- Ephemeral watercourse
- Contour
- Transmission lines
- Indicative overhead transmission line

Plant Community Types

- PCT155: Bluebush shrubland - low condition
- PCT155: Bluebush shrubland - moderate condition
- Highly degraded/cleared (no PCT)

FIGURE 3-1:
CONSTRAINTS MAP

Source: © Department of Customer Service 2020

4.0 Project description

4.1 Secretary's Environmental Assessment Requirements

Table 4-1 sets out the SEARs relevant to the description of the Project.

Table 4-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
This EIS must include: • A full description of the development, including: - Details of construction - Operation and decommissioning - A site plan showing all infrastructure and facilities (including infrastructure that would be required for the development, but the subject of a separate approvals process)	This chapter provides a detailed description of the development. An overview of the Project is provided in **Section 4.2**, including built form, required infrastructure, and servicing arrangements. Further detail regarding the construction and operation of the Project is provided in **Section 4.3** and **Section 4.4**, respectively. **Figure 4-1** illustrates the proposed layout of the Project, whereas **Figure 4-2** depicts the proposed access, circulation and transmission connections and the surrounding services respectively.
The EIS must also be accompanied by a report from a suitably qualified person providing: • a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; and • certification that the information provided is accurate at the date of preparation	A CIV report which meets these requirements has been prepared for the Project and provided to the Department of Planning, Industry and Environment separately by AGL. The CIV of the Project is outlined in **Section 4.2.6.**

4.2 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 4-2**. These features comprise the proposed development for which development consent is sought under this State Significant Development Application (SSDA).

Table 4-2 Details of the 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.
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.
Project layout	Refer to **Figure 4-2**.
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 overhead 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 an above ground 22 kV transmission line 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 - Heavy vehicles including road trucks - Water Trucks - Excavators - Graders - Compactors - Light vehicles

Project	Broken Hill Battery Energy Storage System (BESS)
	• 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 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 *Interim Construction Noise Guideline,* 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 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.

Project	Broken Hill Battery Energy Storage System (BESS)
Operational workforce	The Project would be an unmanned facility that is managed remotely. One to three employees would be required periodically for maintenance activities.
Security	Up to a 2.7 metre high security fence would be constructed around the perimeter of the Site. All access to the Site would be controlled through an access point off Pinnacles Place. An emergency egress gate would be provided along the western boundary of the Site.
Typical operating scenario	The BESS is expected to operate on a 24 hour per day, seven days per week basis. The BESS is expected to undergo approximately one charge and discharge cycle per day, averaging approximately 255 full cycles per year. Based on a 50 MW facility, the Project would have a charge and discharge cycle of up to 100 MW/h.
Services and infrastructure	Existing services and utility infrastructure in the nearby vicinity would be extended, adapted and augmented to meet the demands of the Project.

4.2.1 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.

4.2.2 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. A depiction of the access and circulation for the Site is provided in **Figure 4-2**.

As shown on **Figure 4-2**, 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.

4.2.3 Transmission connection

An above-ground 22 kV transmission line from the Site to the TransGrid Broken Hill substation would be constructed (refer to **Figure 4-1**). It is expected that this line would be approximately 300 metres in length. The proposed transmission line would require the construction of associated infrastructure, including a transmission line landing gantry at the Site and connections at the substation. A number of supporting structures would be required to carry the 22 kV transmission line 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 transmission line 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 line would be constructed within the Project Area shown on **Figure 4-1**, with the transmission line alignment being indicative only. The transmission line construction would aim to avoid impacts on the medium condition vegetation mapped as PCT 155 *Bluebush shrubland on stony rises and downs in the arid and semi-arid zones* (DPIE, 2019a) (refer to **Chapter 8.0 Biodiversity**).

4.2.4 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.

4.2.5 Infrastructure services

Table 4-3 summarises the existing service infrastructure in proximity to the Site, and the expected amendments required to service the Project.

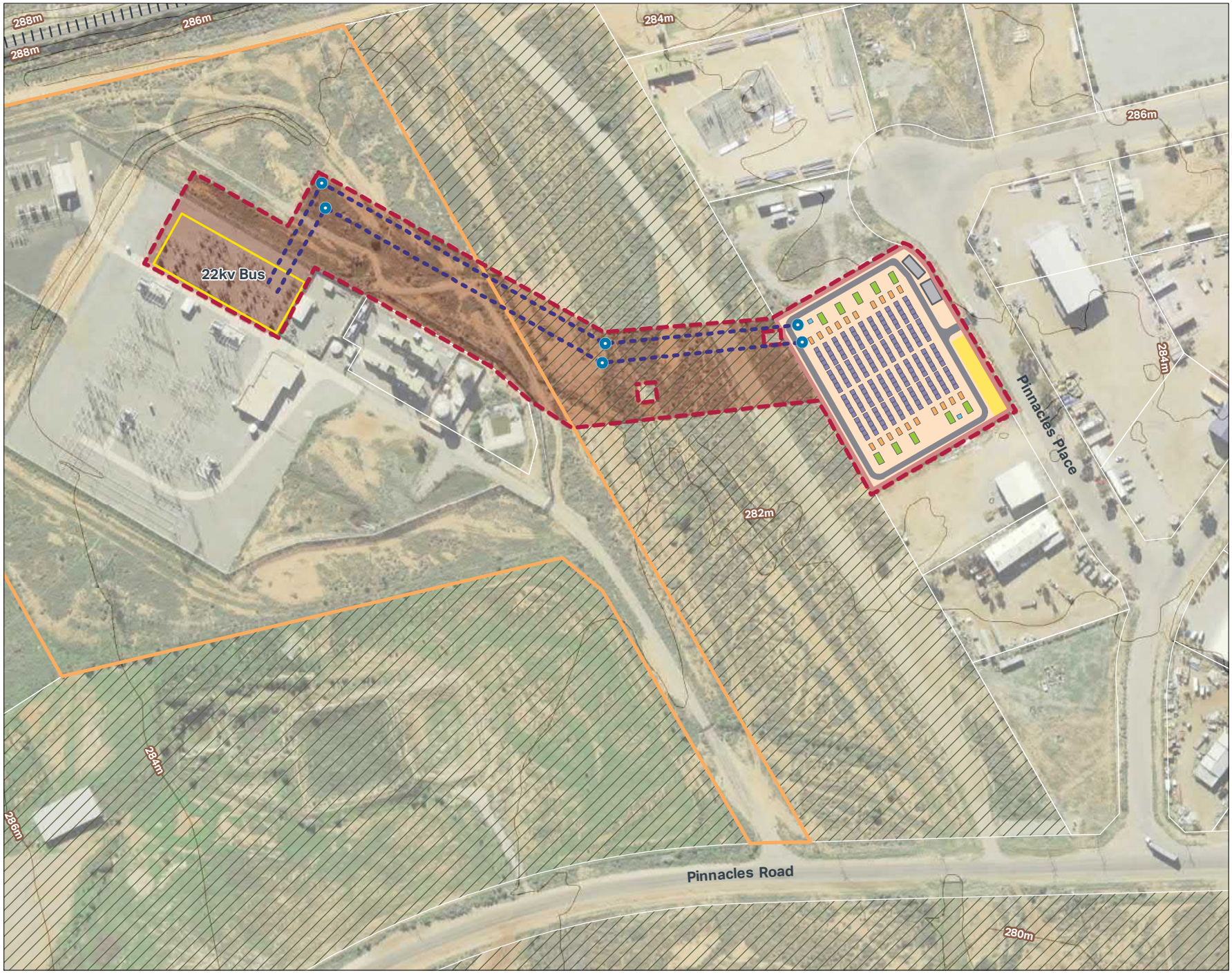
Table 4-3 Infrastructure services

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. Refer to **Chapter 14.0 Surface water, flooding and water use** and **Appendix G Surface Water Assessment** for further detail.
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.

Figure 4-3 shows the existing service infrastructure in proximity to the Site.

4.2.6 Estimated Capital Investment Value

The estimated CIV of the Project would be approximately $80 million Australian dollars (excluding GST).



AECOM

N

0 30 60 m

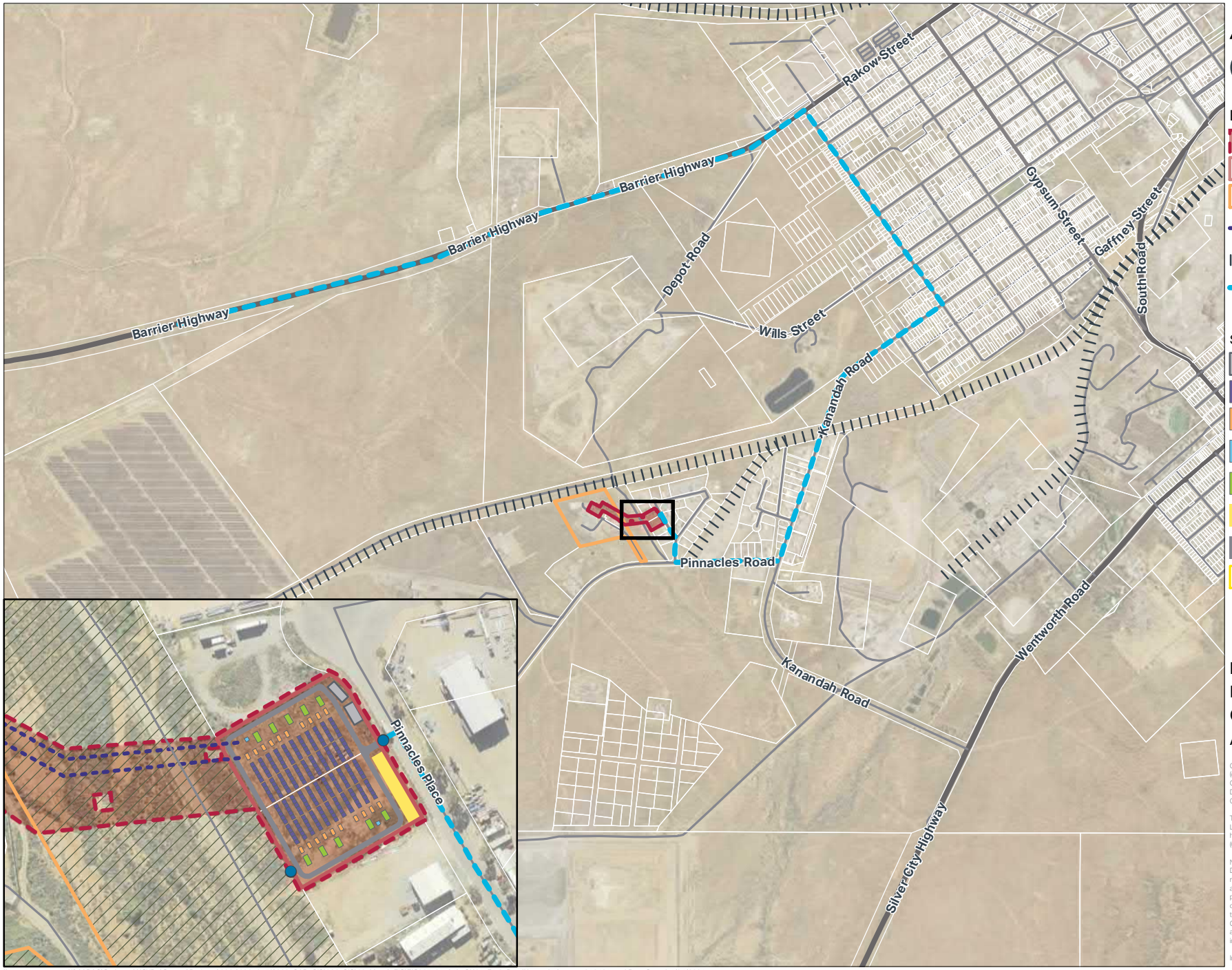
Legend

- Project Area
- Site
- TransGrid Broken Hill Substation
- 22kV Bus
- Commons
- Railway
- Contour
- Indicative overhead transmission line
- Indicative transmission line pole

Site features

- Office building
- Battery
- Inverter
- Medium voltage auxillary switchboards
- Transformer
- Laydown area/operational parking area
- Access road
- Permeable surface

FIGURE 4-1:
PROJECT AREA LAYOUT



AECOM

N

0 250 500 m

Legend

- Project Area
- Site
- TransGrid substation
- Indicative overhead transmission line
- Railway
- Haulage route
- Site access point

Site features

- Office building
- Battery
- Inverter
- Medium voltage auxillary switchboards
- Transformer
- Laydown area/operational parking area
- Access road
- 22kV Bus

FIGURE 4-2:
ROAD NETWORK AND CONSTRUCTION SITE ACCESS

Source: © Department of Customer Service 2020

AECOM

N

0 40 80 m

Legend

- Project Area
- Site
- TransGrid Broken Hill Substation
- Railway
- Potable water supply
- Hydrant
- Sewer line

FIGURE 4-3:
SERVICES PLAN - POTABLE WATER/HYDRANT/SEWER

Source: © Department of Customer Service 2020

4.3 Project construction

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

4.3.1 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, installation of supporting structures and stringing the transmission line.
- 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
- 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 including installation of supporting structures, stringing the transmission line, and works at the transmission line landing gantry 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 Crown Reserve, TransGrid Broken Hill 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.

4.3.2 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.

4.3.3 Construction program

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

Table 4-4 Indicative construction schedule

Task / stage	Date/ duration
Enabling works	Late 2021 – Mid 2022
Civil, structural, mechanical and electrical works	Early-Mid 2022 – Late 2022
Commissioning	Mid-Late 2022
Demobilisation	Late 2022 – Early 2023

4.3.4 Construction plant and equipment

Table 4-5 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 4-5 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
Demobilisation	
Heavy vehicles including road trucks	Backhoe
Water Trucks	Compactors
Light vehicles	

4.3.5 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 (refer to **Chapter 12.0 Transport and access** for further detail). A CTMP would be prepared as part of the CEMP and would be implemented prior to the commencement of construction.

4.3.6 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.

4.4 Operation activities

4.4.1 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.

4.4.2 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.

4.4.3 Operational plant and equipment

Table 4-6 provides an indicative list of plant and equipment that would be used to maintain the Project Site.

Table 4-6 Indicative plant and equipment for operation

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

4.5 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.

5.0 Strategic and statutory context

5.1 Secretary's Environmental Assessment Requirements

Table 5-1 sets out the SEARs relevant to the strategic and statutory context and where the requirements have been addressed in this EIS.

Table 5-1 SEARs – General

Relevant SEARs	
General requirements	**Where addressed**
In particular the EIS must include: • The reasons why the development should be approved having regard to: - Relevant matters for consideration under the *Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development. - The suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses.	The relevant matters for consideration, as contained in section 4.15 of the EP&A Act have been addressed within **Section 5.3**. Specific reference to the relevant matters for consideration are summarised in **Table 5-5** The principles of ecologically sustainable development, and how they have been incorporated in the design, construction and operation of the Project is provided in **Chapter 19.0 Project evaluation and justification.** The suitability of the site has been discussed in **Chapter 2.0 Project area context and background,** as well as **Chapter 3.0 Project development and alternatives.** Further discussion regarding potential land use suitability and conflicts is detailed in **Section 5.3.4**.

5.2 Strategic context

5.2.1 Far West Regional Plan 2036

The *Far West Regional Plan 2036* (Regional Plan) (DPIE, 2017) sets out the strategic land-use planning direction for the region over the next 20 years. The plan's vision is to create a diverse economy, supported by the right infrastructure, strong communities and a resilient natural environment. The following goals are set in the Regional Plan to deliver the vision:

- Goal 1: A diverse economy with efficient transport and infrastructure networks
- Goal 2: Exceptional semi-arid rangelands traversed by the Barwon-Darling River
- Goal 3: Strong and connected communities.

The western area of the Regional Plan comprises the Broken Hill and Central Darling LGAs. Broken Hill is the largest centre in the region and provides business, office and retail services, as well as, complementary activities such as arts, culture, recreation and entertainment to support the social needs of the community. The priorities for the western area of the Regional Plan are to:

- Support Broken Hill as a service centre for the western area of the Far West
- Capture economic benefits from mining
- Grow renewable energy industries
- Grow and diversify agribusiness and irrigated agricultural areas
- Establish value-added manufacturing industries

- Develop a regional tourism trail between Balranald, Wentworth, Mallee Cliffs, Mungo and the Yanga floodplains; between White Cliffs, Menindee, Tibooburra and Silverton; and a Far West Sculpture Trail encompassing sites at Broken Hill, Mutawintji, White Cliffs and Wilcannia
- Respect, protect and conserve European and Aboriginal cultural heritage assets
- Sustainably manage water resources, including the Darling River and Menindee Lakes
- Build community resilience to population and demographic change
- Resolve skilled worker shortages by addressing training options, employability skills and the delivery of education options
- Build resilience to climate change and natural hazards
- Capitalise on key freight corridors, including the Barrier, Silver City and Cobb highways and the Sydney to Adelaide rail route.

The NSW Government has established the Far West Delivery, Coordination and Monitoring Committee to deliver, coordinate and be accountable for achieving the vision and goals of the Regional Plan.

The Project would align with the relevant key priorities identified for the western area of the Regional Plan as outlined in **Table 5-2**.

Table 5-2 Relevant priorities for the western area of the Regional Plan

Regional Plan Priority	Comment
Support Broken Hill as a service centre for the western area of the Far West	The Project would contribute to improved investments and opportunities in the Far West and support Broken Hill as a key service centre. Further discussion is provided in **Section 17.3**, which relates to social and economic impacts.
Grow renewable energy industries	The Project would support the growth of renewable energy industries as it would allow for the firming capacity of renewable energy projects throughout Broken Hill and the wider region through the ability to store energy and provide it to the grid when required. The Project would also support the operation of the Broken Hill Solar Plant and Silverton Wind Farm by storing and dispatching energy and improving the stability of the grid in the region.
Build community resilience to population and demographic change	The Project would provide storage and firming capacity to the NEM and enhance the stability of the grid. This would contribute to building community resilience to future population and demographic changes (refer to **Section 17.3**).
Build resilience to climate change and natural hazards	The Project would support the transition to a renewable energy economy and therefore contribute to building resilience to climate change and natural hazards. The Project would also incorporate initiatives to mitigate possible impacts from noise and air pollution (refer to **Chapter 12.0 Noise and vibration**, and **Section 17.5**, respectively).
Respect, protect and conserve European and Aboriginal cultural heritage assets.	The Project would respect, protect and conserve European and Aboriginal cultural heritage assets through the implementation of safeguards to mitigate potential impacts (refer to **Chapter 9.0Aboriginal Heritage** and **Chapter 10.0 Non-Aboriginal heritage**)

5.2.2 Broken Hill Local Strategic Planning Statement

The *Broken Hill Local Strategic Planning Statement* (LSPS) (Broken Hill City Council, 2020) sets the framework for the economic, social and environmental land-use needs of Broken Hill over the next 20 years (2040). The Broken Hill LSPS generally aims to:

- Create a 20-year land-use vision for land-use planning in Broken Hill
- Identify and give effect to the directions of the Regional Plan, Far West Regional Economic Development Strategy and the Broken Hill Community Strategic Plan
- Highlight the key projects being implemented by Council to broaden the economic base
- Document the key infrastructure projects, including rail, road and airport related developments and upgrades to support Broken Hill's important role as the main regional centre in Far West NSW
- Document the main land-use planning actions required to optimally position Broken Hill for growth and employment, access to services, health and lifestyle
- Ensure all residents of Broken Hill, regional residents and visitors have access to the many services available at Broken Hill.

Broken Hill's economy has traditionally been underpinned by industrial employment. As identified in **Section 5.2.1**, Broken Hill is a strategic centre for the Far West of NSW given its contribution to economic and employment opportunities within the region. It is proposed that Broken Hill would continue to contribute growth in the Far West of NSW by providing diverse opportunities in accommodating population growth and employment, among others. The LSPS also establishes goals for Broken Hill to improve opportunities to increase connectivity and encourage renewable development. This Project is consistent with a number of local planning priorities and actions contained within the LSPS, summarised in **Table 5-3**.

Table 5-3 Relevant planning priorities and actions contained within the LSPS

Local planning priority	Actions supported by the Project
Industry	Investigate opportunities to further diversify Broken Hill's economy through new industries.
Services and connectivity	Undertake a coordinated sub-regional infrastructure strategy for the western area of the Far West Region of NSW, involving collaboration between the relevant Federal, State and Local government authorities and other service authorities to assist in service delivery.
	Investigate opportunities for further renewable energy developments in the Broken Hill LGA and surrounding unincorporated area.

5.2.3 Broken Hill 2033 Community Strategic Plan

The *Broken Hill 2033 Community Strategic Plan* (CSP) (Broken Hill City Council, 2017) outlines the social, economic, environmental, governance and leadership directions expressed by the Broken Hill community. The CSP acknowledges it takes a partnership to achieve these directions, with Government, business and industry all having a role to play in setting a vision for the future. The CSP has identified the following four key directions:

- Our Community
- Our Economy
- Our Environment
- Our Leadership.

Within each priority direction, the CSP identifies numerous strategies that contribute to achieving the overall goal of creating a community that encompasses all aspects of life and sets a vision for the future. The Project is consistent with the relevant directions and strategies contained within the CSP, summarised in **Table 5-4**.

Table 5-4 Relevant planning directions and strategies contained within the Broken Hill 2033 CSP

Direction	Strategy supported by the Project
Our Community	Develop, implement and evaluate strategies to address the impact of a changing population on local facilities and services (CSP 1.2.6)
Our Economy	Pursue new ideas and approaches for business and industry investment, including creative industries, renewable energy and technology related projects (CSP 2.1.7)
Our Environment	Reduce resource consumption and minimise waste (CSP 3.1.1)
	Increase use and innovation of renewable resources and decrease the use of non-renewable resources (CSP 3.1.2)
	Increase involvement in actively protecting the natural environment (CSP 3.2.3)
Our Leadership	Undertake communication and engagement with the community to increase confidence in decision-making (CSP 4.1.1)
	Social, environmental and economic sustainability is considered when making decisions (CSP 4.1.2)
	Decision-makers provide accountability through planning and reporting frameworks (CSP 4.1.3)

5.2.4 Transmission Infrastructure Strategy 2018

The *NSW Transmission Infrastructure Strategy* (Department of Planning and Environment, 2018) is the NSW Government's plan to unlock private sector investment in priority energy infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond. The strategy outlines that although in October of 2018 more than 20,000 megawatts of large-scale projects were progressing through the planning system, representing more than $27 billion in potential investment, for every 20 projects looking to connect to the grid only one is successful.

This Project would help to create additional capacity and redundancy within the local electricity grid to support the principles of the strategy, including:

- Contributing to the possibility of lower energy bills
- Taking a technology neutral approach to new generation projects
- Encouraging private sector led investment
- Regional economic growth and promotion of some job opportunities
- Assisting in the provision of secure and reliable energy.

The *NSW Transmission Infrastructure Strategy* sets out a plan to facilitate private sector investment in priority transmission infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond. The Strategy forms part of the government’s broader plan to make energy more affordable, secure investment in new power stations and network infrastructure and ensure new technologies deliver benefits for customers. The objectives of the Project (as outlined in **Section 1.2**) align with the driving principles and goals set out in the *NSW Transmission Infrastructure Strategy*.

5.2.5 NSW Electricity Strategy 2019

The *NSW Electricity Strategy* (DPIE, 2019b) is the NSW Government's plan for a reliable, affordable and sustainable electricity future. The strategy outlines three approaches for the NSW government to meet these objectives:

- Support the market to deliver reliable electricity at the lowest price, while protecting the environment
- Set an Energy Security Target to ensure that the State has sufficient generation capacity to cope with unexpected generator outages during periods of peak demand, such as during heat waves
- Ensure the State has sufficient powers to deal with an electricity emergency if one arises.

In the development of the strategy, the NSW Government have recognised that congestion in the existing transmission system is leading to a reduced investment in the new infrastructure that is required to support a reduction in electricity prices, improved reliability and protection of the environment. To address this, the strategy aims to improve the efficiency and competitiveness of the NSW electricity market by facilitating the investment in new energy saving, energy storage and transmission, demand response and electricity generation technologies.

The strategy outlines that the cheapest and most efficient way to develop a modern and complex energy system and to replace coal-fired generators is to build a mix of low-cost renewables, gas-fired generators and other storage like batteries and pumped hydro. The 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*.

5.2.6 NSW Energy Roadmap 2020

The NSW Electricity Strategy (DPIE, 2019b) is to be implemented through the NSW Electricity Infrastructure Roadmap (DPIE, 2020b). It envisions a modern electricity system in NSW built on the following five pillars:

1. *"Driving investment in regional NSW: supporting our regions as the State's economic and energy powerhouse.*
2. *Delivering energy storage infrastructure: supporting stable, long-term energy storage in NSW.*
3. *Delivering Renewable Energy Zones: coordinating regional transmission and renewable generation in the right places for local communities.*
4. *Keeping the grid secure and reliable: backing the system with gas, batteries or other reliable sources as needed.*
5. *Harnessing opportunities for industry: empowering new and revitalised industries with cheap, reliable and low emissions electricity".*

The *Electricity Infrastructure Investment Act 2020* and the Electricity Infrastructure Investment Bill 2020 was passed in late 2020. The Project is wholly in keeping with the vision of the NSW Electricity Infrastructure Roadmap in that it represents a private regional investment, delivers energy storage, is appropriately zoned and uses existing transmission infrastructure, provides security to the NEM and provides cost effective and reliable electricity with no additional emissions.

AGL already 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. The Project is a key component of 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.

5.2.7 Broken Hill Sustainability Strategy

The *Broken Hill Sustainability Strategy* (Broken Hill City Council, 2019) provides a direction on how to develop a sustainable and liveable city and recognises that the natural and built environment must be protected in order to have a sustainable, vibrant and liveable future. The *Broken Hill Sustainability Strategy* was developed in response to the Broken Hill 2033 CSP (refer to **Section 5.2.3**) and in particular the third key direction: Our Environment. This direction relates to the conservation and preservation of the natural environment and greater reduction of the human impact on the surrounding environment to ensure a sustainable and healthy community. Three key objectives were identified within this direction to better manage and use the natural resources within the Broken Hill region, including:

- Our environmental footprint is minimised
- Natural flora and fauna environments are enhanced and protected
- Proactive, innovative and responsible planning that supports the community, the environment and beautification of the city.

Each objective contains strategies to contribute in achieving the overall objective of developing a sustainable and liveable city. The strategies relevant to the Project are identified in **Table 5-4** in **Section 5.2.7**.

The *Broken Hill Sustainability Strategy* is underpinned by 11 action plans, all of which were developed to achieve the goals under the CSP's third direction: Our Environment. These include:

- Energy Efficiency
- Renewable Energy
- Gas Consumption
- Transport Energy
- Sustainable Procurement
- Carbon Emissions
- Water
- Waste
- Minimising the Environmental Impacts of Mining
- Enhancing and Protecting the Natural Flora and Fauna
- Built Environment.

The Project would be consistent with the relevant action plans and strategies contained within the Broken Hill Sustainability Strategy.

5.3 Statutory Context

5.3.1 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.

Overview

The Site is in Broken Hill in the Broken Hill Council LGA. Development of the Site for the Project is governed by the application of the EP&A Act. The following EPIs are considered relevant to the Project 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 proposed development 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 in **Section 5.3.1**. It is important to note, however, that because the Project is considered State Significant Development (SSD), the *Broken Hill Development Control Plan 2016* (DCP) does not apply. Consequently, this EIS does not require an assessment against Section 4.15(1)(a)(iii)of the EP&A Act. Notwithstanding this exemption, the relevant sections of the DCP have been considered, where relevant, to review the consistency of the Project with the Broken Hill Council's expectations for the area. A high-level discussion pertaining to the DCP is provided in **Section 5.3.5**.

Matters of consideration

In determining a development application, the consent authority must take into consideration the matters listed under section 4.15(1) of the EPA 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 EIS.

Table 5-5 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	**Sections 5.3.1 & 5.3.4**
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 5.3.3**
Any development control plan, and	**Section 5.3.5**
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 5.3.7**
The regulations (to the extent that they prescribe matters for the purpose of this paragraph), and	**Section 5.3.2**
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	**Chapters 8.0** to **19.0**
The suitability of the site for the development, and	**Chapter 2.0 Project area context and**

Section 4.15(1) Requirement	Document Reference
	background and **Chapter 3.0 Project development and alternatives**
Any submissions made in accordance with this Act or the regulations, and	**Chapter 6.0 Consultation** and **Chapter 19.0 Project evaluation and justification**
The public interest.	

Permissibility

The Project meets the definition of 'development' under Section 1.5 of the EP&A Act as it involves the use of land and the erection of a building. The Project falls within the definition of " 'electricity generating works' as defined by the Standard Instrument, as this definition includes a building or place used for the purpose of 'electricity storage'.

Under Division 4 of the ISEPP, and particularly clause 34 of the ISEPP, "*development for the purpose of electricity generating works may be carried out by any person with consent*" on "*any land in a prescribed rural, industrial or special use zone*". The Site is zoned as IN1 – General Industrial under the Broken Hill LEP in which electricity generating works are permissible with consent. IN1 – General Industrial is a prescribed industrial zone for electricity generating works under the ISEPP. Therefore, the Project is permissible with consent at the Site.

Planning approval pathway

The Project is designated as SSD under the EP&A Act as it satisfies the requirements of Clause 8 of the SRD SEPP, being:

a. 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; and

b. The development is specified in Schedule 1 or 2 of the SRD SEPP.

As discussed above, the Project is permissible with consent in the IN1 zone under Broken Hill LEP and also clause 34 of the ISEPP means that the Project is "*not permissible without development consent under Part 4 of the EP&A Act.*" The Project is also *"development…specified in Schedule 1 or 2* [of the SRD SEPP]*"* as clause 20 of Schedule 1 of the SRD SEPP refers to electricity generating works with a CIV of greater than $30 million. The Project falls within the definition of electricity generating works and the CIV for the Project is estimated at $80 million. On this basis, the Project is classified as SSD.

Section 4.12(8) of the EP&A Act states that a development application for SSD is to be accompanied by an EIS prepared by or on behalf of the applicant in the form prescribed by the regulations. Schedule 2 of the EP&A Regulation sets out the requirements of an EIS and requires that the EIS complies with the environmental assessment requirements that relate to the EIS.

In line with section 4.5 of the EP&A Act, the consent authority for the Project will be the NSW Minister for Planning and Public Spaces or the Independent Planning Commission. The SSD application will be evaluated in line with the requirements of section 4.15 of the EP&A Act.

Table 5-6 outlines each of the approvals referred to in section 4.42 of the EP&A Act and their applicability to the Project. These approvals, if required, cannot be refused if they are necessary for carrying out the SSD.

Table 5-6 Relevant approvals required under section 4.42

Approval	Comment
An aquaculture permit under section 144 of the *Fisheries Management Act 1994*	The Project would not involve aquaculture. Therefore no aquaculture permit would be required.
An approval under section 15 of the *Mine Subsidence Compensation Act 1961*	The Project is not located within a mine subsidence district.
A mining lease under the *Mining Act 1992*	Several mining lease and exploration areas cover the proposed area. Given the Project would involve only surface infrastructure and be of a limited footprint, potential impacts on future mining activities are not anticipated.
A production lease under the *Petroleum (Onshore) Act 1991*	The Project would not involve petroleum production.
An Environment Protection Licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act)	A review of Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) was conducted and the Project would not include any scheduled activities. Consequently, an EPL is not required.
Consent under Section 138 of the *Roads Act 1993*	The Site is located on Pinnacles Place. Pinnacles Place is a local road owned and managed by Broken Hill City Council. The Project would require a new access point to connect the facility to the road network. Consultation with Broken Hill City Council to confirm the requirements of creating a new access road will be undertaken.
A licence under the *Pipelines Act 1967*	No pipelines would be required for the Project.

5.3.2 Environmental Planning and Assessment Regulation 2000

This EIS has been prepared to support the development application for the Project. On 26 August 2020, DPIE issued SEARs for the Project pursuant to Section 4.12(8) of the EP&A Act and in line with Schedule 2 of the EP&A Regulation.

Clauses 6 and 7 of Schedule 2, Part 3 of the EP&A Regulation states that certain information must be included within the EIS. This information, and where it can be found within this EIS, is shown below in **Table 5-7.**

Table 5-7 EIS Statutory Requirements

Requirement	EIS Location
The name, address and professional qualifications of the person by whom the statement is prepared.	**Statement of Validity**
The name and address of the responsible person.	
The address of the land: in respect of which the development application is to be made, or on which the activity or infrastructure to which the statement relates is to be carried out.	**Chapter 2.0 Project Area context and background**
A description of the development, activity or infrastructure to which the statement relates.	**Chapter 4.0 Project description**

Requirement	EIS Location
An assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule.	**Chapters 8.0 Biodiversity** to **17.0 Environmental impact assessment**
A declaration by the person by whom the statement is prepared to the effect that: • the statement has been prepared in accordance with this Schedule; • the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates; and • that the information contained in the statement is neither false nor misleading.	**Statement of Validity**
A summary of the findings of the environmental assessment process.	**Executive summary**
A statement of the objectives of the proposed activity.	**Chapter 1.0 Introduction**
An analysis of any feasible alternatives to the carrying out of the proposed activity, having regard to its' objectives, including the consequences of not carrying out the proposed activity.	**Chapter 3.0 Project development and alternatives**
An analysis of the proposed activity, including a full description of the proposed activity.	**Chapter 4.0 Project description**
A general description of the environment likely to be affected by the proposed activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected.	**Chapter 2.0 Project Area context and background** provides a general description and **Chapters 8.0** to **17.0** provide the environmental impact assessments
The likely impact on the environment resulting from undertaking the proposed activity.	
A full description of the measures proposed to mitigate any adverse effects of the activity on the environment.	**Chapter 18.0 Management and mitigation measures**
A list of any approvals that must be obtained under any other Act or law before the proposed activity may lawfully be carried out.	**Chapter 5.0 Strategic and statutory context**
The reasons justifying the carrying out of the activity in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development (ESD) relating to: • the adoption of precaution in instances of uncertainty (the precautionary principle); • the preservation of the environment as a resource between generations (inter-generational equity); • the conservation of biological diversity and ecological integrity; and • the improved valuation of environmental assets and services-based mechanisms such as the polluter pays principle, lifecycle costing and establishing environmental goals.	**Chapter 19.0 Project evaluation and justification**

5.3.3 State Environmental Planning Policies

The SEPPs relevant to the Project, or the land to which it relates, and have been considered as part of this EIS are outlined in **Section 5.2.2**. Each of those SEPPs are considered further in the following sections.

State Environmental Planning Policy (State and Regional Development) 2011

The SRD SEPP applies to the whole of NSW. Its aim is to identify development that is significant to the State. As noted above, the Project is designated as SSD under clause 8 of the SRD SEPP. Notably, on the basis that the Project constitutes 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 Project is permissible with consent at the Site under clause 34 of the ISEPP.

In addition, clause 45 of the ISEPP applies to a development application for development 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) [Not relevant]

The Site 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 (refer to **Chapter 2.0 Project area, context and background,** and **Figure 3-1**). On this basis, the requirements under clause 45 are applied to this development application, and the requirements under Clause 45(2) must be considered.

Clause 45(2) under the ISEPP 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 DPIE will refer this development application to TransGrid to provide comment on the Project, specifically in relation to potential safety risks. All comments received within 21 days of the notice will be taken into consideration as part of the Submissions Report for the Project.

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 5.3.1** that the Project is 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 Project is located within a disturbed industrial environment, which has limited remnant vegetation of low to moderate quality. An initial assessment has been carried out (refer to **Chapter 8.0 Biodiversity**) that indicates 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 Project 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 SSDA.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) outlines the approach used in NSW for planning and assessing the risks and hazards associated with potentially hazardous or offensive industrial developments. Through this policy, the permissibility of a project is linked to its safety and pollution control performance. SEPP 33 applies to any projects that fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'.

For projects classified as '*potentially hazardous industry'* the policy establishes a comprehensive test by way of a preliminary screening assessment and preliminary hazard analysis (PHA) to determine the risk to people, property and the environment. The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant offsite effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations, as well as transport to and from the site.

A Preliminary Screening Assessment was undertaken in accordance with the SEPP (and DPIE's *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (January, 2011)), with the findings provided in **Section 16.3.2**. Based on the screening assessment, it is evident that the materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored and transported to the Site do not exceed the SEPP 33 thresholds. Notwithstanding the outcome of the screening assessment, DPIE requested that the Project be accompanied by a PHA.

In response to the SEARs, a PHA has been prepared to assess potential hazards and risks associated with the Project. The complete report is attached in **Appendix I Preliminary Hazard Analysis** with relevant sections summarised in **Chapter 16.0 Hazards and risk** of the EIS.

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 Site is not on the list of NSW Contaminated Sites Register and does not appear on the Contaminated Land: Record of Notices.

Chapter 11.0 Soils, groundwater and contamination details the risk of existing contamination within the Site and potential for the Project to result in contamination impacts to any receiving environments. A Detailed Site Investigation (DSI) has been prepared for the Site and is provided in **Appendix D Detailed Site Investigation and Assessment**. Ultimately, the DSI confirmed that the Site is suitable to support the Project, thereby complying with the requirement under clause 7 of SEPP 55.

5.3.4 Broken Hill Local Environmental Plan 2013

The Project is located within the Broken Hill LGA, which is subject to the application of the *Broken Hill Local Environmental Plan 2013* (Broken Hill LEP). The Broken Hill LEP aims to make local environmental planning provisions for land in Broken Hill in accordance with the relevant standard environmental planning instrument under section 3.20 of the EP&A Act. 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 EIS. Instead, the clauses that are relevant to consider include:

- Clause 2.3 – Zone objectives and land use table
- Clause 5.10 – Heritage conservation
- Clause 6.2 – Essential services.

Each relevant clause of the Broken Hill LEP is discussed in further detail in the presiding sections of this EIS.

Zone objectives and land use table

The Project 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 Project is 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 Project 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 Project Description** and **Section 17.2**, which relates to social and economic impacts); particularly during construction of the Project.
- It will provide a complimentary service offering to the local industrial land uses, as well as provide a use for a vacant site that is consistent with Council's intent; being permissible with consent.

- Given the nature of the Project, it's highly unlikely it will adversely impact adjoining industrial land uses. Instead, the provision of additional electrical storage should be seen as complimentary to the locality, by providing additional redundancy in the local market.

In light of the above, the Project 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 varying 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 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 Project Area.

Essential services

Clause 6.2 of the Broken Hill LEP stipulates that *'development consent must not be granted to unless the consent authority is satisfied that the following services that are essential for the development are available or that adequate arrangements have been made to make then available when required:*

(a) The supply of water

(b) The supply of electricity

(c) The disposal and management of sewage

(d) Stormwater drainage or onsite conservation

(e) Suitable vehicular access.

As detailed in **Section 4.2.5**, the Project has availability of potable water, electricity supply and sewerage disposal. A concept stormwater design has been developed for the Project and is discussed in **Chapter 14.0 Surface water, flooding and water use**. Vehicular access to the Site is provided from Pinnacles Place, via Pinnacles Road. **Chapter 13.0 Transport and access** provides more detail regarding transport and access routes to the Site. On this basis, it is evident the Project has access to essential services and, therefore, compliance with clause 6.2 of the Broken Hill LEP.

5.3.5 Broken Hill Development Control Plan 2016

As detailed within **Section 5.2.2**, given that the Project is SSD, the DCP does not apply. Notwithstanding this exemption, the DCP has been considered for stormwater management (refer to **Chapter 14.0 Surface water, flooding and water use**), where it provides the most relevant assessment framework within the Broken Hill LGA.

5.3.6 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 this development application there were no draft environmental planning instruments relevant to the Project or subject site; that should be considered as part of this development.

5.3.7 Voluntary planning agreements

Section 4.15(1)(a)(iiia) 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 SSDA there were no known planning agreements applicable to the Project or the Site.

5.3.8 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 only the transmission line is proposed, is subject to an undetermined Aboriginal Land Claim number 40469 lodged by the NSWALC under the ALR Act. AGL has undertaken consultation with BHLALC and the NSWALC over the land claim (refer to **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 DPIE, 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 Site is located in a predominantly cleared area with an ephemeral watercourse to the west of the Site. It is likely that some overland flows from the Site may drain to the ephemeral watercourse, which heads south and eventually joins into Kelly's Creek.

A controlled activity approval would not be required by virtue of Section 4.41 of the EP&A Act. This section of the Act specifies certain approvals that are not required for SSD, including an activity approval under section 91 of the WM Act. Despite this provision, this section of the Act does not remove the requirement for obtaining an aquifer interference approval. Field investigations activities were carried out that included drilling to a depth of 8 metres below natural ground level (refer to **Chapter 11.0 Soils, groundwater and contamination**). Groundwater was not encountered during these investigation activities. As such, the requirement for an aquifer interference approval is unlikely.

Protection of the Environment Operations Act 1997

The objects of the POEO Act contained in section 3 include is 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 does not involve the generation of electricity. The Project stores and releases electricity that has already been generated. Accordingly, an EPL is not required for the 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 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 8 April 2021) confirmed that the site 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 SSDA. 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.

Further guidance is provided under section 7.9(3), which denotes that the EIS, which accompanies any such application, is to include the biodiversity assessment required by the environmental assessment requirements (i.e. SEARs).

A BDAR has been undertaken for the Project. The BDAR is provided in **Appendix B Biodiversity Development Assessment Report** with relevant aspects discussed in **Chapter 8.0 Biodiversity**. 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 (refer to **Section 8.4**). On 22 October 2020, a new version of the BAM came into force. Clause 6.31 of the *Biodiversity Conservation Regulation 2017* (NSW) provides that, where the BAM is changed, a biodiversity assessment report in respect of a State significant development may, within 12 months of the change, be prepared on the basis of the BAM in force before the change. By virtue of the Project being SSD, the transition arrangements are applicable, and the BAM 2017 is appropriate for the assessment of this Project.

A calculation of the nature and extent of biodiversity credits required due to ecological impacts associated with the Project has been undertaken using the BAM-Calculator (BAM-C). The results of the BAM-C in terms of vegetation integrity scoring for vegetation zones and associated ecosystem offset credit requirements are shown in **Section 8.4.4**. Following the implementation of the management and mitigation measures provided in **Section 8.5**, the Project is considered consistent with the objectives BC Act.

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 roads authorities, among others. Section 7 of the Roads Act defines the respective road authorities depending on the classification of road. Of relevance to this Project 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, and
- 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*.

As detailed in **Chapter 4.0 Project description**, the Project involves the construction of a new driveway connecting to Pinnacles Place, in order to provide access to the Site. As such, an approval under section 138 of the Roads Act will be required to be obtained from Broken Hill Council (being the roads authority) prior to the commencement of any work in, on or over Pinnacles Place.

Heritage Act 1977

The *Heritage Act 1977* (NSW) 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 Project is the Old Broken Hill City Abattoir (I100); located approximately 800 metres south-east of the Site. Due to the distance of the Project from the nearest non-Indigenous heritage item, it is not anticipated that the Project 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 2.2.5** the proposed transmission line 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.

It is important to note, that these land use zones were repealed upon the introduction of the *Broken Hill Local Environmental Plan 2013* (refer to **Section 5.3.4**). A review of Council's records indicate that the Site 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 5.3.1**, the Project is also consistent with the intended development of the Site; being a permissible innominate land use under the PoM.

Details regarding consultation with the Willyama Common Trust is included in **Section 6.4**. Consequently, the Project is consistent with the CM Act.

5.3.9 Commonwealth legislation

The *Airports Act 1996* (Airports Act), provides regulation for airports on Commonwealth land. All Commonwealth airports (including Broken Hill Airport) are subject to the provisions of the Airports Act and its associated regulations. Broken Hill Airport is located around four kilometres south-east of the Project. The Project would not directly impact Airport land, which would constitute a controlled activity under section 182 of the Airports Act. As such, additional approval for a controlled activity would not be required with regard to the Airports Act. The Project falls within the Obstacle Limitation Surfaces (OLS) 15-kilometre radius of the Airport. Engagement with Broken Hill Airport identified that no OLS permit is required. No further consideration is afforded to the Airports Act for the purpose of this Project.

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 Project Area 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 a 10 km of the Site are provided in **Table 5-8.**

Table 5-8 MNES within 10km of the Site

MNES	MNES within 10km 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 Project would be constructed is not Commonwealth land, and there is no Commonwealth land within proximity to the Project that could be impacted by the construction or operation of the Project.

The BDAR (discussed in **Chapter 8.0 Biodiversity**, 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 Project.

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 in January 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 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).

5.3.9.1 Native Title Act 1993

The *Native Title Act 1993* (NSW) (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.

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 on 20 December 2020 using the NNTT Native Title Vision online system (refer to **Appendix C Aboriginal Cultural Heritage Assessment Report**). It is noted that Lots 57 and 58 in DP258288 (i.e. the Site) are freehold, whilst Lot 7302 in DP1181129 is freehold land that is administered by Broken Hill City Council and is classified as Commons under the *Commons Management Act 1989* (discussed in **Section 5.3.8**). A previous Native Title Claim by the Barkandji Traditional Owners for the Commons was determined on 16 June 2015; with Native Title ruled as being extinguished.

6.0 Consultation

6.1 Secretary's Environmental Assessment Requirements

Table 6-1 sets out the SEARs relevant to consultation and where the requirements have been addressed in this Environmental Impact Statement (EIS).

Table 6-1 SEARs – Consultation

Relevant SEARs	
Consultation	**Where addressed**
During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders and mineral title holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development, Broken Hill City Council, Crown lands and NSW Aboriginal Land Council. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	This chapter provides an overview of the consultation undertaken for the Project to date. Details regarding consultation with Government agencies and non-Government stakeholders are outlined in **Section 6.4**. A detailed description of the consultation process, the issues raised and where the issues have been addressed within the EIS is outlined in **Section 6.4**.

6.2 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 feasibility, planning and development phase.
2. **Inform the local community and stakeholders** of upcoming milestones or key decision points, demonstrating our 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 lifespan of the project and beyond, with engagement activities each year.
7. **Meet regulatory community engagement requirements** required for the development application process.

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

- **Be proactive** – AGL will engage with communities early and often, 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
- **Support our employees and contractors to engage well** – AGL will provide tools, peer support and training to enable our staff to deliver on their commitment
- **Continuously improve our 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 best practice, including the International Association of Public Participation (IAP2) Quality Assurance Standard (2015) and the Accountability AA1000 Stakeholder Engagement Standard (2011).

6.3 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 feasibility, planning and development phases. AGL will inform the local community and stakeholders at key milestones as the Project progresses, with the aim to demonstrate our commitment to transparency and accountability.

The Project 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 neighbours and key 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 6.4** of this EIS.

6.4 Consultation activities undertaken to date

6.4.1 Government and non-Government consultation

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

Furthermore, during the preparation of the SEARs, DPIE consulted with key stakeholders to obtain their input into the preparation of the SEARs; requesting AGL to address their specific concerns.

A summary of the consultation with relevant stakeholders is presented in **Table 6-2**. Where relevant, a cross reference to where the issue has been addressed in the EIS is also provided.

Table 6-2 Government Agencies and Non-Government Stakeholders consultation summary

Stakeholder	Method	Date	Comments	Where addressed in EIS
Federal Member for Parkes, Mark Coulton MP	Phone meetings	December 2019, September 2020 and April 2021 (on going)	Welcomed the update and was pleased about the Project being built in the Parkes electorate with a particular interest in the number of jobs that would be generated during construction.	The anticipated construction workforce is outlined in **Section 4.3.6**
NSW State Member for Barwon, Roy Butler MP	Phone meetings	December 2019, September 2020 and February 2021 (on going)	Grateful for the update and asked for regular briefings requested that the local community in Broken Hill is engaged during preparation and in advance of the exhibition of the EIS.	Community consultation undertaken during the EIS phase is outlined in **Section 6.4.2**.
Broken Hill City Council Board – Mayor Darriea Turley and (then) General Manager James Roncon	Phone meetings	September 2020 and November 2020	Pleased that the Project aligns with Council's renewable energy objectives. Interested in job creation related to construction and operation of the Project and asked to be briefed regularly as planning for the Project progresses.	The anticipated construction workforce is outlined in **Section 4.3.6** and the operational workforce is outlined in **Section 4.4.2.**
Broken Hill Local Aboriginal Land Council – Chairperson and Chief Executive Officer	Phone meetings and email	September 2020 – ongoing	The BHLALC Board endorsed the Project and asked that work collaboratively with AGL throughout Project design and construction and develop an Aboriginal Heritage Management Plan which would include the findings of any site surveys. AGL has also placed Aboriginal Cultural Heritage notifications in local publications to seek input from Aboriginal community members about the Project.	**Chapter 18.0 Management and mitigation measures** outlines AGL's commitment to working with the BHLALC throughout the Project lifecycle. An assessment of the Project's potential impact on Aboriginal cultural heritage is included in **Chapter 9.0 Aboriginal heritage.** This chapter outlines AGL's commitment to engage the BHLALC during the Project and to develop an Aboriginal Heritage Management Plan.

Stakeholder	Method	Date	Comments	Where addressed in EIS
NSW Aboriginal Land Council –Senior Land Rights Officer and previously Land Rights Officer	Phone meetings and email	September 2020 – and ongoing	NSW Aboriginal Land Council provided guidance on the process of creating easements and/or licences on Lot 7302 DP1181129 where there is the undetermined Aboriginal Land Claim and advised AGL to liaise with the BHLALC regarding the land and advised that there is a standard practice for a 'no objection' to an activity to Lot 7302 DP1181129.	Consultation with the BHLALC is outlined in **Section 6.4**.
TransGrid	Formal connection enquiry, phone meetings and email	November 2019 and ongoing	AGL made a formal enquiry for connection to the TransGrid Broken Hill substation. TransGrid have provided a connection enquiry response letter and Preliminary Impact Assessment detailing the works required to connect to the transmission system. AGL is also progressing a Connection Process Agreement with TransGrid.	This transmission connection application is being undertaken separately to the development application. As such, it is not referenced within this EIS.
	Email	December 2020	TransGrid requested that an environmental assessment be conducted for this connection and for appropriate setbacks be applied.	An assessment of the environmental constraints associated with the connection of the BESS to the TransGrid Broken Hill substation has been included in this EIS. The Project Area layout is shown in **Figure 4-1**.
Crown Lands	Phone meetings and email	September 2020 – March 2021	Crown Lands provided advice regarding Aboriginal land claims and confirmed the land is within the Willyama Common, which is administered by the Broken Hill City Council. AGL will continue to consult with Crown Lands and Broken Hill City Council.	Consultation with the BHLALC is outlined in **Section 6.4**. See also engagement with the Broken Hill City Council below.
NSW Government - Biodiversity and Conservation Division (BCD) –Senior Team Leader Planning	Email	December 2020	BCD provided recommendations relating to biodiversity and flooding. BCD requests the EIS identify direct and indirect impacts to biodiversity during both construction and operation.	Issues relating to biodiversity are assessed in **Chapter 8.0 Biodiversity**.

Stakeholder	Method	Date	Comments	Where addressed in EIS
			AGL is requested to undertake quantitative flood modelling, assess the impacts of the Project on flood behaviour and consider any existing flood studies in the area.	Issues relating to flooding are assessed in **Chapter 14.0 Surface water, flooding and water use**.
Broken Hill City Council –Strategic Land Use Planner	Email, meetings	December 2020 and ongoing	Council stated its interest in a number of areas including the socioeconomic value, national heritage value, and the management of access, waste and dust during construction. Additionally, given that Council manages the Willyama Common Trust, AGL will consult with them on associated land matters.	The CIV of the Project is outlined in **Section 4.2.6** and an assessment of the socioeconomic value is included in **Section 17.3**. Construction access for the Project is identified in **Chapter 13.0 Transport and access** which outlines AGL's commitment to consulting with Council on transport and access impacts during construction. An assessment on the generation and disposal of waste by the Project is included in **Section 17.4**. Commitment to dust management is outlined in **Section 17.5**.
Crown Lands	Email	December 2020	Crown Lands has identified the following for further consideration: • Lot 57 and 58 DP258288 are freehold land held by Galena Developments Pty Ltd and Globe IBH Pty Ltd as tenants in common. • Lot 2 DP102040 is freehold land held by Electricity Transmission Ministerial Holding Corporation. They also identified Lot 7302 DP 1181129 as being a portion of the Willyama Common Trust	Lot 7302 DP1181129 is considered Commons, pursuant to the *Commons Management Act 1989*, which is administered by Broken Hill City Council. Compliance with the Willyama Common Management Plan is discussed in **Section 5.3.8**.

Stakeholder	Method	Date	Comments	Where addressed in EIS
NSW Government; DPIE Water and Natural Resources Access Regulator – Project Officer (NRAR)	Email	December 2020	DPIE and NRAR had an interest in surface water groundwater and requested that an adequate and secure water supply be identified for the life of the Project and a site water balance be conducted. An assessment of the impacts on surface and groundwater is to be undertaken. AGL is to take into consideration relevant legislation, policies and guidelines, notably the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans.	**Chapter 14.0 Surface water, flooding and water use** includes an assessment of the surrounding water supply and impacts on surface water and groundwater.
Fire and Rescue – NSW – Team Leader Infrastructure Liaison	Email	December 2020	The Fire and Rescue NSW sought to be consulted once information becomes available on fire safety and emergency response management.	The development application will be referred to FRNSW following lodgement with DPIE. Submissions provided by FRNSW will be addressed during the Response to Submission phase of the assessment.
NSW Government, Heritage NSW – Aboriginal Cultural Heritage	Email	December 2020	The NSW Government Heritage Office were interested in Aboriginal cultural heritage values, requesting consultation with Aboriginal people, surveys conducted and for any Aboriginal Heritage assessment to outline procedures if Aboriginal artefacts are identified.	An assessment of the Aboriginal cultural heritage significance of the Project Area and its surrounds has been included in **Chapter 9.0 Aboriginal heritage** and **Appendix C Aboriginal Cultural Heritage Assessment Report**.
NSW Government – Regional NSW – Mining, Exploration & Geoscience (MEG) – Geological Survey of NSW (GSNSW). Manager, Land Use Assessment	Email	December 2020	The NSW Government: Regional NSW - MEG GSNSW has asked that Perilya Broken Hill Limited be consulted as they are the titleholder of consolidated mining lease (CML) 10, and exploration licence (EL) 6689 and operate within the area. AGL has provided an update on the Project and will continue to consult as planning for the Project progresses.	The development application will be referred to NSW Regional – MEG and GSNSW following lodgement with DPIE. Submissions provided by NSW Regional – MEG and GSNSW will be addressed during the Response to Submission phase of the assessment.

Stakeholder	Method	Date	Comments	Where addressed in EIS
Transport for NSW (TfNSW)	Email	December 2020	TfNSW requested a traffic impact assessment be completed and that a traffic management plan be developed following Project approval.	An assessment of the traffic impacts associated with the Project and the proposed management and mitigation measures are included in **Chapter 13.0 Transport and access**.
Essential Energy.	Meeting	February 2021	Project briefing provided, including the existing transmission line infrastructure and the proposed transmission line across Lot 7302 DP 1181129. AGL will continue to engage with Essential Energy as detailed design progresses.	AGL consulted with Essential Energy during the preparation of the EIS; specifically in relation to the transmission line infrastructure. Essential Energy did not raise any concern regarding the Project. Further consultation between AGL and Essential Energy will be undertaken separately to this development application

Government agencies and other non-government stakeholders will continue to be informed about the Project as required and will be notified of any significant milestones.

6.4.2 Community consultation

Community consultation was undertaken in accordance with clauses 6 and 7 of Schedule 2 of the EP&A Regulations. AGL advised adjacent neighbours, as well as the nearest residential neighbour about the Project in November 2020.

Key topics of interest identified to date are included in **Table 6-3**.

Table 6-3 Topics of interest raised through consultation process - Community

Topic of interest	Addressed within EIS
Employment	**Chapter 17.0 Other matters**
Aboriginal heritage	**Chapter 9.0 Aboriginal heritage**
Stability of the energy system in Broken Hill	**Chapter 3.0 Project development and alternatives**

Overall the community and stakeholders remain supportive of the Project. AGL will continue to consult with the community and key stakeholders about the Project and will address any questions or issues as they arise.

6.5 Ongoing consultation

The community and other stakeholders, namely adjacent neighbours, the nearest residential neighbour and Broken Hill LALC, will continue to be engaged throughout the EIS process A community and stakeholder engagement plan (CSEP) developed by AGL (2020) for the Project, outlines the following strategic approach which is to be adopted during consultation:

- Be open and transparent
  - Allow key stakeholders an opportunity to provide comment and raise issues important to them
  - Consult with the community and stakeholders on key decisions
  - Invite key stakeholders to contribute their views on the Project and feed into the decision-making process
- Be accountable
  - AGL are accountable for developing trusting relationships with the community and other stakeholders
  - Maintaining accountability will allow for more meaningful feedback from the community.

AGL has consulted with and will continue to consult with the community and key stakeholders using traditional and social media, meetings, website and project updates, and the distribution of fact sheets.

The EIS will be placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period community members and stakeholders have the opportunity to submit feedback to DPIE.

6.6 Consultation during construction

Community engagement will be maintained throughout the construction of the Project. Continued community consultation and engagement, through the means of social and traditional media, will encourage community involvement in the Project.

A specific email address, dedicated phone number and online forum would be set up to receive and address any expressions of interest from the community.

7.0 Environmental scoping assessment

7.1 Environmental scoping for the Project

This EIS documents a range of environmental assessments. These assessments identify potential environmental impacts that may result from the Project and identify measures to manage or mitigate these impacts as appropriate.

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

- Review of available information and documents relating to the existing environment
- Site visits
- Request for assessment requirements from DPIE
- Receipt of the SEARS for the Project (refer to **Appendix A Secretary's Environmental Assessment Requirements Response Table**)
- Consultation with government agencies, community groups and other stakeholders (refer **Chapter 6.0 Consultation**)
- A review of relevant legislation and planning policy (refer to **Chapter 5.0 Strategic and statutory context**)
- Identification of the sensitivities of the local environment
- Understanding the characteristics of the Project,
- Identification of other projects or actions that may cumulatively add to the residual impacts from the Project, including those currently present at the Site.

An initial review of potential issues for consideration in the EIS has been undertaken, with the aim of determining the likely level of assessment required to adequately and appropriately address each issue. In undertaking the initial screening, consideration has been given to the significance of potential environmental impacts for each environmental aspect (through a preliminary environmental risk screening) and also to the likely level of stakeholder interest in each issue. The inclusion of stakeholder perceptions of potential environmental impacts is considered an important part of determining the level of assessment that should be applied, given that key stakeholder matters may not necessarily align with a purely technical analysis of environmental risks.

By combining the likely significance of each identified environmental issue with the expected level of stakeholder interest, an assessment has been made as to whether each issue is integral to the assessment of the Project, and whether a detailed specialist investigation or desktop analysis would be appropriate. Where a high level of stakeholder interest is expected, potential environmental impacts have been determined to be key issues, requiring a more detailed assessment irrespective of the outcomes of environmental risk screening.

7.2 Summary of Potential issues identified

Following the scoping process, potential impacts were determined for the following environmental matters, as relevant to the Project:

- Biodiversity
- Aboriginal heritage
- Non-Aboriginal heritage
- Soils, groundwater and contamination
- Noise and vibration

- Transport and access
- Surface water, flooding and water use
- Bushfire
- Hazard and risk
- Visual
- Social and economic
- Waste
- Air quality.

7.3 Prioritisation of potential issues

A risk assessment was undertaken to determine the key issues and prioritise the scope of work for each environmental matter. This risk assessment considered the issues mentioned in:

- The SEARs; and
- Submissions from relevant stakeholders and the public

The risk assessment was undertaken based on the guidelines outlined in AS/NZS ISO 31000:2018.

Table 7-1 outlines the key environmental matters in relation to the Project.

Table 7-1 Prioritisation of Environmental Matters

High Priority Matters	Medium Priority Matters	Low Priority Matters
• **Chapter 9.0 Aboriginal heritage**	• **Chapter 8.0 Biodiversity** • **Chapter 10.0 Non-Aboriginal heritage** • **Chapter 11.0 Soils, groundwater and contamination** • **Chapter 12.0 Noise and vibration** • **Chapter 13.0 Transport and access** • **Chapter 14.0 Surface water, flooding and water use** • **Chapter 15.0 Bushfire** • **Chapter 16.0 Hazards and risks**	• **Chapter 17.0 Other matters** - **Visual (Section 17.2)** - **Social and economic (Section 17.3)** - **Waste (Section 17.4)** - **Air quality (Section 17.5)**

7.4 Format of assessment chapters

Where possible, a common format has been adopted for each of the assessment chapters of the EIS. This format is outlined below.

Secretary's Environmental Assessment Requirements

The introduction outlines the relevant SEARs for the particular environmental matter and outlines where within the chapter (or elsewhere) they are addressed. In certain cases, a particular requirement may be excluded. If so, this is indicated, and a justification provided.

Methodology

This section summarises the methodology for:

- Determining the existing environment and identifying sensitive receptors or values as relevant to the particular environmental matter
- Determining criteria or thresholds for the assessment of the significance of impacts
- Conducting an assessment of the potential impacts in relation to the relevant environmental matter
- Assessing whether these impacts are significant
- Providing a suite of measures to avoid, minimise and/or manage these impacts.

For each environmental aspect an explanation is provided outlining the approach to identifying impacts and assessing whether a potential impact is likely to be significant. Assessments can be either quantitative (relying on calculation, modelling, criteria, standards and thresholds) or qualitative (using certain scientific material, case studies, experience etc., but ultimately making decisions based on professional judgement).

Where relevant, legislation, policies and plans relevant to the specific environmental matter may also be included in this section. A review of legislation and policy relevant to the Project as a whole is provided in **Chapter 5.0 Strategic and statutory context**.

Existing environment

This section describes the key components, characteristics and status of the existing environment relevant to the environmental aspect. This includes detail on historic and ongoing operations at the Site, as relevant to the matter under consideration. Key sensitive receptors or values for the assessment of the relevant environmental matter will be identified.

Impact assessment

This section identifies potential impacts of the Project on relevant receptors for particular environmental aspects assessed. It includes aspect-specific methodologies for evaluating the significance of the impact in accordance with the criteria detailed in the method of assessment.

In general, impacts may be referred to as either prior to (potential impact) or following mitigation (residual impact). For this section of each chapter all impacts are potential impacts.

Impacts can be considered as:

- Direct or indirect
- Adverse or beneficial, or
- Significant, non-significant (negligible) or neutral.

Where existing criteria, guidance, environmental standards or assessment methodologies exist, the significance of an impact is based on that information. Where possible and/or necessary quantitative assessments about the significance of an impact are made using this information. Where no explicit guidance or Site-specific quantitative information exists, a qualitative assessment of the significance of an impact is made. Where quprefamalitative judgements are required, some or all of the following characteristics are considered to understand the potential magnitude of impact:

- Extent - the area potentially affected by the impact
- Magnitude - the size or amount of the impact
- Duration - how long the impact is likely to last

- Frequency - whether the impact is continuous, brief or intermittent
- Timing - if the impact occurs at a particularly sensitive time,
- Permanence - whether the impact is permanent or temporary.

Consideration of whether an impact is significant will depend on the importance or sensitivity of the receptor (e.g. as defined by legislation, policy, standards, guidance or professional judgement) and the magnitude of the impact (as determined by quantitative or qualitative means). For the purposes of the 'Impact assessment' section of each technical assessment chapter all impacts are considered 'alone' and not cumulatively.

Management and mitigation measures

This section describes the measures that have been identified to avoid, reduce and compensate for the relevant impacts on the environment arising from the Project.

The mitigation hierarchy has been used to help identify management and mitigation measures for each of the technical assessments. Wherever possible, impacts have firstly been avoided where possible, then either reduced at the source or at the receptor where avoidance cannot be achieved and finally either compensated or offset where avoidance or reduction is not possible or would not achieve practicable or acceptable levels of mitigation.

If management and mitigation measures are to be implemented through particular environmental management plans, these are also discussed in this section.

The mitigation and management measures from all technical assessment chapters are collated into a single table within **Chapter 18.0 Management and mitigation measures.**

Cumulative Impacts

Certain residual impacts from a project alone can potentially result in cumulatively significant impacts with other projects. **Section 17.6** of this EIS includes a consideration of cumulative impacts. Given that the residual impacts expected from this Project are anticipated to be minor and the lack of nearby projects that could result in significant cumulative impacts, the cumulative impact assessment has been considered in **Chapter 17.0 Other matters.**

8.0 Biodiversity

8.1 Secretary's Environmental Assessment Requirements

Table 8-1 sets out the SEARs relevant to biodiversity matters and where the requirements have been addressed in this EIS.

Table 8-1 SEARs – Biodiversity

Relevant SEARs	
Biodiversity	**Where addressed**
This EIS must include: An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016 (NSW)*, the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCD and DPIE determine that the proposed development is not likely to have any significant impacts on biodiversity values.	**Section 8.3** identifies the existing environment of the Project Area, including the potential species and their likelihood of occurrence within the Project Area. **Section 8.4** assesses the likely impacts associated with the construction and operation of the Project. The offset requirements (as per the BAM) are outlined in **Section 8.4.5**.
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	**Section 8.4** assesses the impacts of the Project in line with the avoid, minimise and offset framework along with the direct and indirect impacts of the Project in accordance with the BAM.

8.2 Methodology

A BDAR has been undertaken for the Project. The complete report is attached in **Appendix B Biodiversity Development Assessment Report** (BDAR) with relevant aspects summarised in this Chapter. The primary objective of the BDAR is to use the Biodiversity Assessment Methodology (BAM) (OEH 2017) to describe and assess the potential impacts of the Project on the ecological values within the Project Area and surrounds, determine whether the Project is likely to have an impact on threatened biodiversity listed under the *Biodiversity Conservation Act 2016 (NSW)* (BC Act) and identify and quantify associated biodiversity offsetting requirements.

On 22 October 2020, a new version of the BAM came into force. Clause 6.31 of the *Biodiversity Conservation Regulation 2017* (NSW) provides that, where the BAM is changed, a biodiversity assessment report in respect of a State significant development may, within 12 months of the change, be prepared on the basis of the BAM in force before the change, . The BDAR was finalised in May 2021, which is within the 12 month transitionary arrangements period; pursuant to clause 6.3.1 of the *Biodiversity Conservation Regulations 2017*. As such, reliance on the BAM 2017 is appropriate to inform the BDAR. .

The BDAR has 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.

The resources and survey guidelines used in the development of the BDAR are detailed in **Table 8-2**.

Table 8-2 Assessment resources and guidelines used in the development of the BDAR

Assessment resources/guideline	
Resources	• Biodiversity Assessment Method (BAM) (OEH 2017) • BAM Operational Manual – Stage 1 (OEH 2018) • BAM Operational Manual – Stage 2 (DPIE 2019) • BAM Calculator 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 (DEWHA 2011)

The study area for the assessment is shown in **Figure 8-1**. This area includes a 1500m buffer around the Project Area.

8.2.1 Stage 1: Biodiversity assessment

Landscape

An assessment of landscape features was undertaken for the Project. To understand the landscape value of the study area an assessment needs to consider a number of factors including:

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

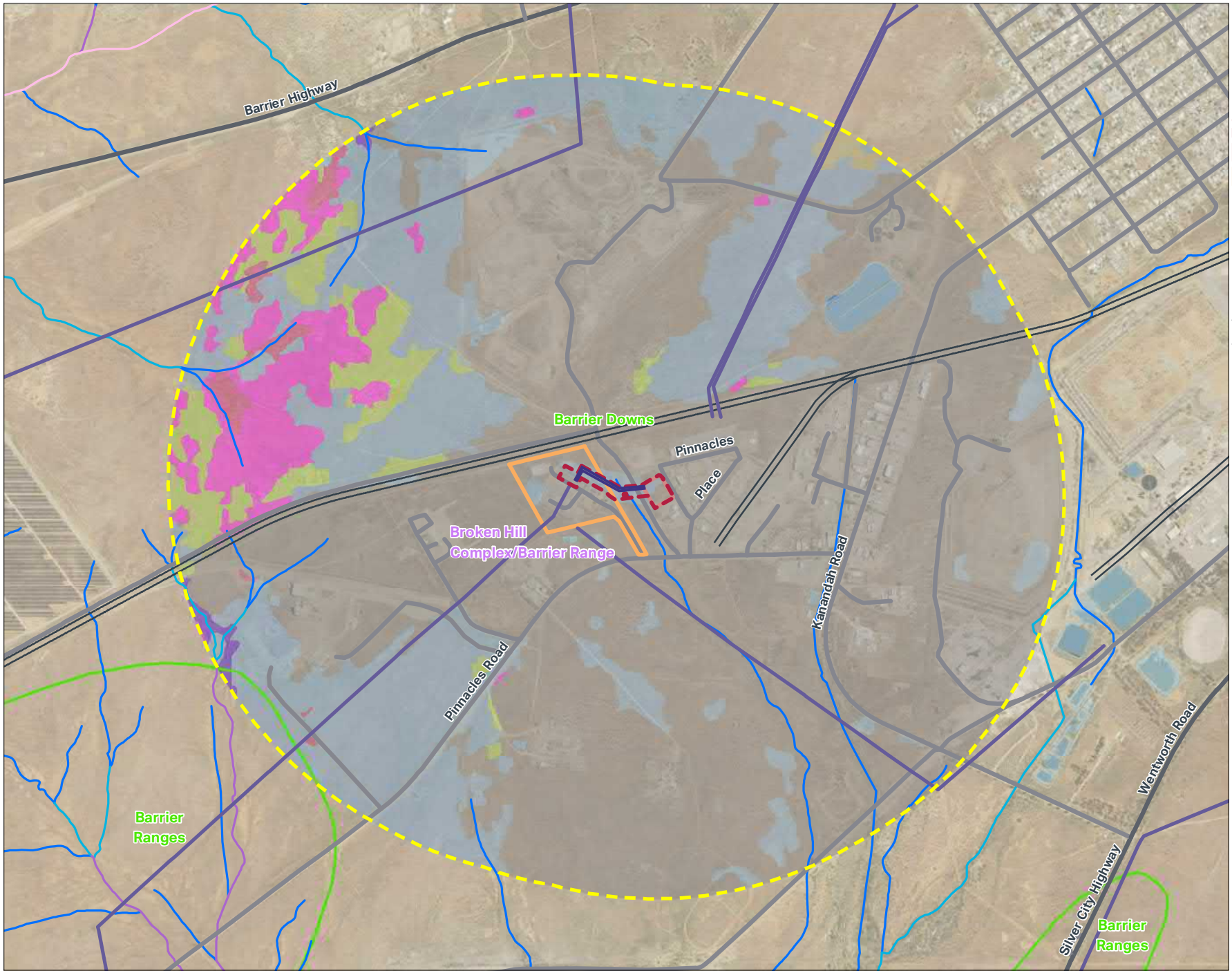
For each factor, the current state of the landscape was assessed and then compared with the state of the landscape if the Project were to proceed.

Native vegetation

A native vegetation assessment was undertaken for the Project. An initial desktop assessment was undertaken, including a review of relevant databases and existing vegetation mapping to identify likely vegetation communities and threatened biodiversity with the potential to occur in the Project Area.

Database searches within a 30 kilometre radius around the Project Area were conducted prior to the site visit in December 2019, and updated in December 2020 to identify threatened biodiversity and migratory species with known occurrences or with the potential to occur in the Project Area. The following databases were searched:

- *NSW BioNet Atlas Database* (DPIE 2020) for spatial records of threatened flora listed under the BC Act
- *EPBC Act Protected Matters Search Tool* (PMST) (Department of Agriculture, Water and the Environment (DAWE) 2021) for fauna, flora and ecological communities identified as Matters of National Environmental Significance (MNES)
- Biodiversity Assessment Method Credit Calculator (BAM-C) (2018) tool to identify candidate species, credit species and predicted ecosystem credit species known or predicated to occur within the study area for consideration with the BAM-C.



AECOM

N

0 250 500 m

Legend

- Project Area
- Site
- TransGrid Broken Hill substation
- Study area
- IBRA region/subregion
- Mitchell Landscape
- Transmission lines
- Proposed transmission line
- Main roads
- Local roads
- Railway
- 1st order stream
- 2nd order stream
- 3rd order stream
- 4th order stream
- Waterbody

Plant Community Type

0	150
123	155
128	156
136	247
139	

FIGURE 8-1:
BIODIVERSITY STUDY AREA AND EXISTING VEGETATION

Source: © Department of Customer Service 2020

Existing vegetation mapping (State Vegetation Type Map: Western Region v1.0. VIS_ID 4492 (DPIE, 2019c) was also examined prior to the field survey to determine the vegetation communities likely to be present in the study area.

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

Five categories for likelihood of occurrence were attributed to native vegetation after considering the number and proximity of known records and presence or absence of preferred habitat types (e.g. native vegetation types and microhabitats). The categories are outlined in **Table 8-3**. Species requiring further assessment included:

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

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

Table 8-3 Likelihood of occurrence criteria

Likelihood rating	Native species criteria
Known	The species was observed within the Project Area.
High	It is likely that a species inhabits or utilises habitat within the Project Area.
Moderate	Potential habitat for a species occurs within the study area. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the Project Area.
Low	It is unlikely that the species inhabits the Project Area.
None	The habitat within the study area is unsuitable for the species.

Native vegetation field surveys were undertaken using survey methods consistent with the BAM to map and quantify the condition of Plant Community Types (PCTs) within the Project Area. Field surveys were conducted on two occasions and included the following:

- BAM plots, vegetation mapping, incidental threatened flora survey and habitat assessment – 10 and 11 December 2019
- Targeted threatened flora survey and further habitat assessment – 29 October 2020
- Opportunistic observations of flora, Threatened Ecological Communities (TECs), habitat quality and high threat and priority weeds.

A total of four BAM plots were undertaken during surveys. Data from one of these plots were added to the BAM-C, as this was considered the most representative of areas impacted by vegetation clearing. Targeted surveys were undertaken according to relevant survey guidelines within areas of suitable habitat for three threatened flora species.

Field surveys were conducted within and outside of the Project Area, as the project design location was not finalised until after the field surveys were undertaken. The native vegetation survey effort is shown on **Figure 8-2**.

The native vegetation field survey methods and effort are discussed in detail in **Appendix B Biodiversity Development Assessment Report**. In addition to surveying BAM plots and vegetation transects, targeted survey for Mallee Golden Wattle (*Acacia notabilis*), Slender Darling Pea (*Swainsona murrayana*), Yellow-keeled Swainsona (*Swainsona flavicarinata*) and Creeping Darling Pea (*Swainsona viridis*) during relevant flowering periods was also completed.

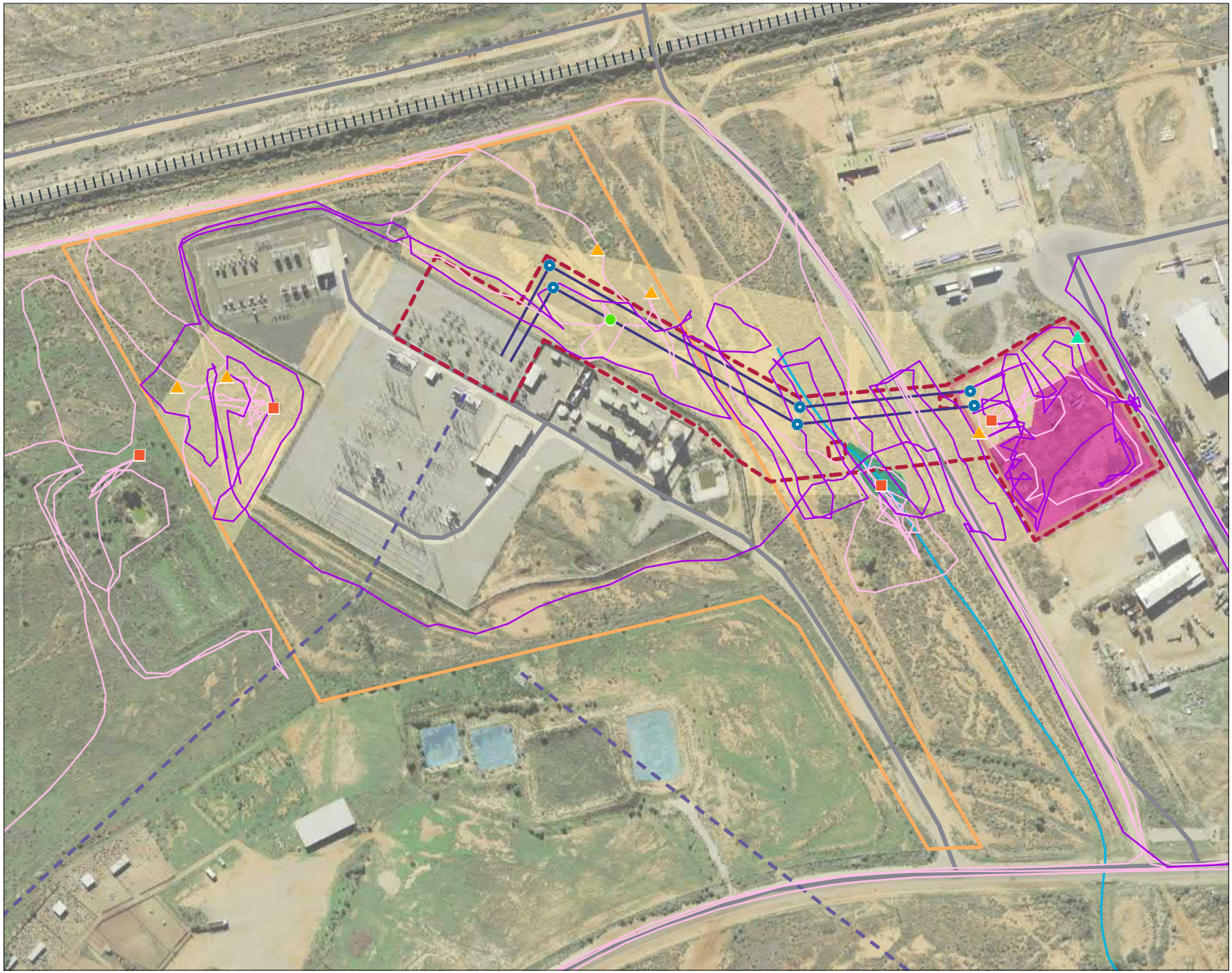


FIGURE 8-2:
VEGETATION ZONES AND SURVEY EFFORT

Source: © Department of Customer Service 2020

Threatened species and populations

An assessment of threatened fauna species and populations was undertaken as part of this biodiversity assessment. As per the native vegetation assessment, an initial desktop assessment was completed, including a review of relevant databases and existing vegetation mapping to identify fauna habitat and threatened fauna with the potential to occur in the Project Area. Results of the desktop assessment were reviewed and a likelihood of occurrence analysis was undertaken for each species prior to field surveys to inform the field survey requirements.

Five categories for likelihood of occurrence were attributed to threatened species and populations after considering the number and proximity of known records and presence or absence of preferred habitat types (e.g. native vegetation types and microhabitats) . Species requiring further assessment included:

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

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

Field surveys were undertaken in December 2019 and October 2020 and included the assessment of the following habitat features that could support threatened fauna:

- 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.

The threatened fauna species and populations field survey methods and effort are discussed in detail in **Appendix B Biodiversity Development Assessment Report**. Field survey effort included:

- Mapping of hollow-bearing trees and searching for the presence of nests, logs, outcrops and other important habitat features
- Survey of threatened fauna species with a moderate to high likelihood of occurrence.

8.2.2 Stage 2: Impact assessment

In accordance with the BAM, proponents must identify measures to avoid, mitigate and offset the potential impacts of a Project on biodiversity values, including landscape features, native vegetation and threatened species and populations.

An impact assessment was undertaken in the BDAR in line with this methodology that outlines:

- The avoidance, management and mitigation measures incorporated into the Project design or that would be employed during construction and operation of the Project to reduce potential impacts on biodiversity values (**Section 8.4.1** and **Section 8.5**)
- An assessment of potential direct and indirect impacts during construction (**Section 8.4.2**)
- An assessment of potential direct and indirect impacts during operation (**Section 8.4.3**)
- A conclusion regarding whether there is the potential for impacts on biodiversity values that are at risk of serious and irreversible impacts (SAII) (**Section 8.4.4**). 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).

Section 8.4.5 provides a calculation of the biodiversity credits required due to ecological impacts associated with the Project. This calculation has been undertaken using the BAM-C.

8.3 Existing environment

The Site 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 Project Area.

8.3.1 Landscape features

A description of the landscape features of the study area is provided in **Table 8-4**.

Table 8-4 Landscape features

Landscape features	Description	Figure reference
Project Area size	2.5 hectares	**Figure 1-2**
IBRA bioregion/subregion	The Project is located within the Barrier Range IBRA Sub-region which is within the Broken Hill Complex IBRA bioregion.	**Figure 8-1**
NSW (Mitchell) Landscapes	The Project Area is mapped as occurring within the Barrier Downs Landscape.	**Figure 8-1**
Rivers, streams and estuaries and Strahler stream order	There are no rivers or estuaries in close proximity to the study area. There is an unnamed ephemeral watercourse that crosses the transmission line corridor. This is classified as a 1st order stream, however, no water was present during field surveys.	**Figure 8-1**
Wetlands within and adjacent to development	There are no wetlands in close proximity to the study area.	**Figure 8-1**
Connectivity features	There is limited connectivity within the study area due to the presence of roads, railway track and industrial infrastructure in neighbouring properties.	**Figure 3-1** and **Figure 8-1**
Geological significance and soils	There are no karst, caves, crevices, cliffs or other areas of geological significance within the Project Area. There are no high hazard soil areas.	-

8.3.2 Native vegetation

A desktop assessment and field survey were undertaken to determine the presence of native vegetation within and surrounding the Project Area (refer to **Section 8.2.1**). A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the Project Area.

A total of 37 flora species were recorded across the study area, including 26 native species and 11 exotic species. Details of these species and full historic data recorded from plots performed throughout the identified vegetation zones are included in Annex 2 of **Appendix B Biodiversity Development Assessment Report**.

Targeted flora surveys were undertaken within areas of suitable habitat to identify flora species with the potential to occur within the Project Area. The targeted survey identified four candidate species (refer to **Table 8-5**) which are identified by the BAM-C as credit species and/or have a moderate to high likelihood of occurring in the Project Area. Of the species identified, two species are subject to SAII. **Table 8-5** includes habitat constraints and survey timing 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, targeted surveys were conducted. Based on the results of the field survey and habitat assessment (refer to **Table 8-5**), none of the candidate flora species are present in the Project Area.

Table 8-5 Candidate and other native vegetation species with the potential to occur within the Project Area and require a targeted survey.

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAII?	Habitat constraint (BAM)	Inclusion in assessment based on?	Targeted survey undertaken?	Status within the Project Area
Candidate species								
Acacia notabilis	Mallee Golden Wattle	E	-	No	None identified in BAM-C	BAM-C Candidate species	Yes Associated PCTs present in relevant IBRA subregion Initial survey carried out in required season. Not detected.	Absent
Swainsona flavicarinata	Yellow-Keeled Swainsona	E	-	Yes (Principle 3)	None identified in BAM-C	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.	Absent
Swainsona viridis	Creeping Darling Pea	E	-	Yes (Principal 3)	None identified in BAM-C	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out in required season. Not detected.	Absent
Swainsona murrayana	Slender Darling Pea	V	V	No	None identified in BAM-C	BAM-C Candidate species	Yes Associated PCT present in relevant IBRA subregion Targeted survey carried out.	Absent
Total number of species	4	**-**	**-**	**2 candidate SAII**	**-**	**-**	**-**	**All species absent**

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

One PCT was mapped within the Project Area (refer to **Figure 8-2**):

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

The PCT recorded does not align to a TEC listed in the BC Act or EPBC Act. Approximately 0.82 hectares of this PCT could be impacted by the Project. One BAM plot was required to be completed for this PCT. The condition of this PCT was found to be low.

Three weeds were recorded during field surveys within the Project Area including:

- African Boxthorn *(Lycium ferocissimum)*: listed as a manageable high threat weed (HTW) which can be effectively managed with specific management practices. African Boxthorn is also listed as a priority weed for the western region of NSW
- Mesquite (*Prosopis spp.*): listed as priority weed for the western region of NSW
- Velvet Mesquite (*Prosopis velutina*): listed as priority weed for the western region of NSW.

No threatened fungi species were identified by the BAM-C as credit species and/or having a moderate to high likelihood of occurring in the impact area.

8.3.3 Threatened species and populations

A desktop assessment and field survey were undertaken to determine the presence of native vegetation within and surrounding the Project Area (refer to **Section 8.2)**. A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the Project Area.

A total of seven threatened fauna species were identified by the BAM-C as species credit species.

Table 8-6 lists the subject species identified as requiring further assessment. **Table 8-6** 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 present within the Project Area.

Table 8-6 Candidate threatened fauna species with the potential to occur or require further survey

Scientific name	Common name	NSW BC Act	EPBC Act	Subject to SAII?	Habitat constraint (BAM)	Degraded habitat	Reason for inclusion?	Survey undertaken and comments/justification	Presence
Candidate species									
Amytornis modestus obscurior	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**
Antaresia stimsoni	Stimson's Python	V	n/a	No	Rocky areas within 500m of rocks or gibber		BAM-C	No Limiting habitat not present	**No**
Ardeotis australis	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
Ctenophorus mirrityana	Barrier Range Dragon	E	n/a	No	Rocky areas Requires rock crevices		BAM-C	No Limiting habitat not present	**No**
Hieraaetus morphnoides	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 SAII?	Habitat constraint (BAM)	Degraded habitat	Reason for inclusion?	Survey undertaken and comments/justification	Presence
Candidate species									
Lophocroa leadbeateri	Major Mitchell's Cockatoo	V	n/a	No	Hollow bearing trees Living or dead tree with hollows greater than 10 cm diametre		BAM-C	No Limiting habitat not present	**No**
Lucasium stenodactylum	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 SAII**	-	-	-	-	-

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

As shown in **Table 8-7**, of the seven candidate species generated by the BAM-C, only one was found likely to occur on occasion: *Ardeotis australis* (Australian *Bustard).*

Based on the results of the BAM calculator, field survey and habitat assessment, the species shown in **Table 8-7** were identified as present or absent from the Project Area.

Table 8-7 List of predicted and candidate threatened species for the Project Area

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Black-breasted Buzzard	*Hamirostra melanosternon*	Yes – assumed present
Bolam's Mouse	*Pseudomys bolami*	Yes – assumed present
Dusky Hopping-mouse	*Notomys fuscus*	Yes – assumed present
Dusky Woodswallow	*Artamus cyanopterus*	Yes – assumed present
Flock Bronzewing	*Phaps histrionica*	Yes – assumed present
Forrest's Mouse	*Leggadina forresti*	Yes – assumed present
Grey Falcon	*Falco hypoleucos*	Yes – assumed present
Kultarr	*Antechinomys laniger*	Yes – assumed present
Little Eagle	*Hieraaetus morphnoides*	Yes – assumed present
Little Pied Bat	*Chalinolobus picatus*	Yes – assumed present
Long-haired Rat	*Rattus villosissimus*	Yes – assumed present
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	Yes – assumed present
Marble-faced Delma	*Delma australis*	Yes – assumed present
Pied Honeyeater	*Certhionyx variegatus*	Yes – assumed present
Redthroat	*Pyrrholaemus brunneus*	Yes – assumed present
Ringed Brown Snake	*Pseudonaja modesta*	Yes – assumed present
Rufous Fieldwren	*Calamanthus campestris*	Yes – assumed present
Sandy Inland Mouse	*Pseudomys hermannsburgensis*	Yes – assumed present
Spotted Harrier	*Circus assimilis*	Yes – assumed present
Stripe-faced Dunnart	*Sminthopsis macroura*	Yes – assumed present
Wedgesnout Ctenotus	*Ctenotus brooksi*	Yes – assumed present
White-fronted Chat	*Epthianura albifrons*	Yes – assumed present
Woma	*Aspidites ramsayi*	Yes – assumed present
Candidate species (species credit species)		
Australian Bustard	*Ardeotis australis*	Yes – assumed present on occasion for further consideration
Thick-billed Grasswren (north-west NSW subspecies)	*Amytornis modestus obscurior*	No – closest population 175 kilometres away. Habitat degraded
Stimson's Python	*Antaresia stimsoni*	No – key habitat features absent
Barrier Range Dragon	*Ctenophorus mirrityana*	No – habitat absent

Common name	Scientific name	Status
Predicted threatened species (ecosystem credit species)		
Major Mitchell's Cockatoo	*Lophocroa leadbeateri*	No – limiting habitat not present
Crowned Gecko	*Lucasium stenodactylum*	No – habitat degraded. Species not detected
Little Eagle	*Hieraaetus morphnoides*	No – key habitat features absent
MNES		
Dusky Hopping-mouse	*Notomys fuscus*	Yes – assumed present for further consideration

A likelihood assessment was undertaken to determine which of the species identified in **Table 8-7** are likely to occur within the Project 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 Project 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 Project Area, and the absence of tracks or burrows for sightings during field survey, it is highly unlikely to occur within the Project 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 Project Area on occasion. As such, this is the only candidate species which has been assumed present for offsetting purposes (refer to **Table 8-7**).

8.4 Impact assessment

The Project 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
- An assessment of the potential direct and indirect impacts during construction
- An assessment of the potential direct and indirect impacts during operation.

These points are discussed further below.

8.4.1 Avoidance of impacts

In accordance with the BAM, the Project 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 Project. The Preliminary Biodiversity Assessment concluded that:

- All options for the Project 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 Project.

Mitigation measures proposed to be implemented during construction and operation of the Project (refer to **Section 8.5)** would also include measures to avoid impacts on biodiversity values within the Project Area and its surrounds.

8.4.2 Construction

Direct impacts

The direct impacts associated with the Project and the likelihood that they would occur are outlined in **Table 8-8**.

Table 8-8 Assessment of direct impacts as a result of the Project construction

Impact	Extent of impact as a result of the Project	Impact likelihood
Direct impacts		
Removal or modification of native vegetation	Approximately 0.27 hectares of low condition native vegetation (PCT 155) would be removed from the Site. Another 0.55 hectares of low condition native vegetation (PCT 155) occurs along the transmission line corridor 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 the location of transmission line poles and vegetation trimming.	**Known**
Loss of individuals of a threatened species	No threatened species were recorded, and due to the low condition habitat within the Project Area, there is a low likelihood that any individuals would be impacted by the 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 Project would not limit foraging or breeding habitat for threatened species within a 3km radius of the study area. Vagrant or wide-ranging species such as the *Ardeotis australis (*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 are proposed to be used as part of the Project. Harmful substances used in construction would all be controlled in accordance with Australian Standards.	**Low**
Fragmentation	Vegetation within the Project Area is already fragmented by other land uses and informal tracks. Only low condition vegetation would be impacted. No additional barriers to movement would be introduced. Given the degraded nature of the Site, fragmentation impacts would be negligible.	**Moderate**

Indirect impacts

Indirect impacts associated with the Project and the likelihood that they would occur are outlined in **Table 8-9**.

Table 8-9 Assessment of indirect impacts as a result of the Project construction

Impact	Extent of impact as a result of the Project	Impact likelihood
Indirect impacts		
Loss of individuals through starvation	The small amount of habitat to be removed in the Project Area is not considered likely to cause loss of individuals through starvation.	**Low**
Loss of individuals through exposure	Habitat to be removed in the Project Area occurs primarily as patchy stands of native groundcover and mid-storey vegetation. Areas of habitat nearby would not be impacted by the Project. The Project is not considered likely to cause a loss of individuals through exposure.	**Low**
Edge effects (noise, light, traffic)	The Project would introduce edge effects such as noise and traffic during construction.	**Low**
Weed invasion	Weeds may be introduced or spread at the Project Area during construction if weed control protocols are not adhered to. This would be monitored and managed via weed control.	**Low**
Deleterious hydrological changes	The Project would not alter existing flow regimes of any watercourses. The watercourse that passes through the Project Area is ephemeral and would not be impacted by the Project during construction. Transmission line poles would not be erected within the riparian corridor (i.e. 10 metres either side of the waterway).	**None**

8.4.3 Operation

Direct and indirect impacts

Biodiversity impacts associated with the Project operation and the likelihood that they would occur are outlined in **Table 8-10**.

Table 8-10 Assessment of direct and indirect impacts as a result of the Project operation

Impact	Extent of impact as a result of the Project	Impact likelihood
Direct impacts		
Death through poisoning	No poisons are proposed to be used as part of the Project. Harmful substances used during operation and during weed management (of required) would all be controlled in accordance with Australian Standards.	**Low**
Indirect impacts		
Predation by domestic and/or feral animals	The 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**
Loss of shade/shelter	The removal of 0.82 hectares of native vegetation (worst-case scenario) in the Project Area would result in a loss of a small portion of shade and shelter for local fauna. This impact is considered negligible considering there is similar habitat in the immediate vicinity that would not be impacted by the Project.	**Known**

Impact	Extent of impact as a result of the Project	Impact likelihood
Deleterious hydrological changes	The Project would not alter existing flow regimes of any watercourses. The watercourse that passes through the Project Area is ephemeral and would not be impacted by the Project during operation. Transmission line poles would not be erected within the riparian corridor (i.e. 10 metres either side of the waterway).	**None**
Weed invasion	Weeds may be introduced or spread at the Project 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 Project Area, and human activity is unlikely to increase substantially post-construction.	**Known**

8.4.4 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 SAII. 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 SAII are known or considered likely to occur in the Project Area.

8.4.5 Offset requirements

A calculation of the nature and extent of biodiversity credits (ecosystem and species) required due to ecological impacts associated with the Project has been undertaken using the BAM-C.

Table 8-11 presents the results from the BAM-C, including vegetation integrity scoring for vegetation zones and associated ecosystem offset credit requirements.

Table 8-11 Ecosystem offset credit requirement

PCT – best fit	Impact area (ha)	Current Vegetation Integrity score	Future Vegetation Integrity score	Change in Vegetation Integrity Score	Biodiversity risk weighting	Required credits
PCT - 155	0.82	21.9	0	-21.9	1.75	8

Table 8-12 presents the results from the BAM-C for the required species offset credit requirements. As per **Table 8-7**, the Australian Bustard is the only candidate species which has been assumed to be present.

Table 8-12 Species credit requirements

Threatened species	Habitat impacted (ha)	Required credits
Australian Bustard (*Ardeotis australis*)	0.82	9

8.5 Management and mitigation measures

The implementation of management measures would reduce the potential biodiversity impacts of the Project to the greatest extent practicable. A list of the management and mitigation measures that would be implemented during the construction and operation of the Project are listed below in **Table 8-13**.

Table 8-13 Management and mitigation measures - Biodiversity

ID	Management and mitigation measure	Timing
B1	A Biodiversity Management Plan would be prepared and include the following measures: • establish exclusion zone around the area of PCT 155 in moderate condition, to ensure it would not be impacted by the Project • establish an exclusion zone so that the transmission line poles would not be placed within 10 metres either side of the 1st order stream • 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 *Biosecurity Act 2015* (Cth)	Construction
B2	Following construction activities in the transmission line corridor, 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 *Biosecurity Act 2015* (Cth)	Operation
B4	AGL would meet their offsetting requirements of this Project as determined by the BAM-C following detailed design	Operation

9.0 Aboriginal Heritage

9.1 Secretary's Environmental Assessment Requirements

Table 9-1 sets out the SEARs relevant to heritage and where the requirements have been addressed in this EIS.

Table 9-1 SEARs – Heritage

Relevant SEARs	
Heritage	**Where addressed**
This EIS must include: An assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents	An assessment of potential Aboriginal heritage impacts of the Project is included in **Section 9.4**. The consultation process is detailed in **Section 9.2.1**. Further detail of the consultation undertaken is provided in **Appendix C Aboriginal Cultural Heritage Assessment Report** (including **Section 6.0** and **Appendix E** of that report).

9.2 Methodology

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been undertaken for the Project to identify the Aboriginal cultural heritage values of the Project Area and assess the potential impact of the Project on identified Aboriginal cultural heritage values.

The complete report is attached in **Appendix C Aboriginal Cultural Heritage Assessment Report** with relevant aspects summarised within this chapter.

The ACHAR was conducted in accordance with clause 60 of the National Parks and Wildlife Regulation 2019 (NSW) and with reference to the following guidelines:

- 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)
- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011)
- 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).

The Aboriginal cultural heritage assessment involved:

- Consultation with Aboriginal stakeholders for the purpose of identifying the Aboriginal heritage values of the Project Area
- Conducting an archaeological assessment involving a desktop study and an archaeological survey of the entire Project Area.

9.2.1 Consultation

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

It is noted that the land classified as Commons, where only the transmission line corridor is proposed, is subject to Local Aboriginal Land Claim number #40469 =. A previous Native Title Claim by the Barkandji Traditional Owners (NP2020/001) for the Commons was determined on 16 June 2015, with Native Title extinguished.

AGL has undertaken consultation with BHLALC and the NSWALC over the land claims. This includes ongoing consultation via phone meetings and email since September 2020.

NSWALC provided guidance on the process of creating easements and/or licences within the Commons where there is the undetermined Aboriginal Land Claim and advised AGL to liaise with the BHLALC regarding the land. AGL and BHLALC have negotiated terms and will formalise these into an agreement to allow access to an easement for the transmission line corridor. Further detail on the consultation specific to these land claims is provided in **Chapter 6.0 Consultation**. AGL has also undertaken consultation with Broken Hill Council throughout the development on the Project, given that Council manages the land within the Commons. Further detail on consultation with Broken Hill City Council is provided in **Chapter 6.0 Consultation**.

Barkanndji #8 Native Title Determinants (previous claimants of Native Title) have also been consulted as a Registered Aboriginal Party (RAP) for the Project. This included involvement in the fieldwork component of the ACHAR and review of the draft ACHAR. Further detail is provided in the following sections.

Stage 1 – Notification and registration

The following regulatory agencies were notified of the Project and asked to provide contact details of relevant stakeholders for the purpose of preparing an ACHAR:

- Heritage NSW
- BHLALC
- Office of the Registrar, *Aboriginal Land Rights Act 1983 (NSW)*
- National Native Title Tribunal
- Native Title Services CORP (NTSCORP) Limited
- City of Broken Hill Council
- Western Local Land Service.

Responses were received from four of these groups providing details of persons or groups who hold cultural knowledge of the area (refer to Section 3.1 of **Appendix C Aboriginal Cultural Heritage Assessment** for details of the responses).

A public notice was placed in the Barrier Daily Truth on Wednesday 25 November 2020 and letters were written inviting expressions of interest (EOI) from Aboriginal people who hold cultural knowledge of the area. A total of four Aboriginal people or organisations registered an interest in the Project, including:

- Cally Doyle
- Wilyakali Aboriginal Corporation
- BHLALC
- Barkanndji #8 Native Title Determinants.

Stage 2 – Presentation of information about Project

During Stage 2, RAPs were provided with information about the scope of the Project and the proposed cultural heritage assessment process. Information about the Project Area and the Project was provided to the RAPs as part of the registration of interest process described in Stage 1. Information on the proponent and Project was included in an EOI letter mailed out on 3 December 2020.

Stage 3 – Gathering information about cultural significance

All RAPs were provided a draft of the proposed assessment methodology for the ACHAR on 22 December 2020. RAPs were given a minimum of 28 days to review and provide feedback. No responses were received on the proposed project methodology.

A field team of two AECOM heritage specialists and RAP representatives completed an archaeological survey of the Project Area on Wednesday 20 January 2021. The survey was not undertaken within the TransGrid Broken Hill substation due to the extent of past disturbances. All survey was conducted on foot, with a total of five transects completed across the Project Area. Participants in the survey were spaced roughly at 10 metre intervals during the survey.

The following RAPs participated in the fieldwork component of the ACHAR:

- Wilyakali Aboriginal Corporation
- Barkanndji #8 Native Title Determinants
- BHLALC.

During fieldwork, attending representatives did not disclose any Aboriginal cultural values for the Project Area; however, all commented on the heavily disturbed nature of the Project Area.

Stage 4 - Review of draft assessment report

All RAPs were sent a draft of the ACHAR on 10 March 2021 for review and comment (either by email or mail). The RAPs were provided with 28 days to provide comments. Following this period, RAPs who had not provided comments were contacted again by way of telephone call. No comments were provided by the RAPs. A consultation log with details of this consultation is provided in Appendix F of **Appendix C Aboriginal Cultural Heritage Assessment Report**.

9.3 Existing environment

This section summarises the landscape and cultural context of the Project Area. The results of the field surveys and assessment of significance is also presented. Further detail is provided in **Appendix C Aboriginal Cultural Heritage Assessment Report**.

9.3.1 Landscape context

Consideration of the landscape context is based on the 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 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, economic plant and animal resources (i.e. edible and/or otherwise useful), and raw materials for the production of stone and organic implements. 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.

Key notes regarding the landscape context of the Project Area include:

- Mapped as occupying the lower slopes and outwash area of the southern Barrier Ranges, the topography of the Project Area comprises an area of level to very gently inclined south facing slope
- One ephemeral drainage watercourse is located within the Project Area; the upper portion of a 1st order ephemeral tributary of Kelly's Creek, whose central channel is located approximately 5.5 kilometres south of the Project Area. The channel of the ephemeral watercourse is barely perceptible on the ground and only holds water during rain and flooding events

- Reference to the 1:100,000 Broken Hill Stratigraphy (Wills, 1989) map indicates that the eastern half of the Project 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 a 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 Project Area. However, no outcrops of this material, worked or otherwise, were noted during the survey as detailed in **Section 9.3.4**

- Quartz and/or silcrete gibber pavements similar to those noted in other parts of the greater Broken Hill area region (for example Shiner, 2008) do not occur within or immediately surrounding the Project Area

- Native vegetation within the Project 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 historical aerials for the Project Area indicate that it was fully cleared prior to 1982

- Field observations and historical aerial photographs indicate that the Project Area mostly comprises highly disturbed land with negligible potential for in-situ Aboriginal objects to be present.

9.3.2 Ethnohistoric context

Available sources indicate that the Project 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 said to have occupied the area surrounding Broken Hill.

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, following Attenbrow (2010), a distinction can be drawn between the two, with clans comprising local descent groups and bands comprising land-using groups who, though not necessarily all of the same clan, camped together and cooperated daily in hunting, fishing and gathering activities.

Accounts of a number of early observers (for example Bonney, 1883 and Howitt, 1904) 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.

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). After being displaced from their country, Aboriginal people have since returned to country and retain strong cultural connections to the land. Today, the Wilyakali people are actively involved in the protection and promotion of their culture for future generations.

9.3.3 Archaeological context

Regional context

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 (Shiner, 2008; Holdaway & Fanning, 2014; Holdaway et al., 2000; Witter, 2004). Geoarchaeological research carried out at various locations across the rangelands has demonstrated that the surface archaeological record of this region is both spatially and temporally discontinuous (Fanning, 2002; Fanning et al., 2008; Shiner, 2008; Fanning et al., 2009). Surface distributions of stone artefacts and heat retainer hearths typically lack clear, readily definable boundaries.

AHIMS Database review

A search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 15 December 2020 for a 10 by 10 kilometre area centred on the Project Area, extending 5 kilometres to the north, south, east and west. The search 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.

Of these Aboriginal sites, none are located wholly or partially within the Project Area. The closest previously recorded site – open artefact site "Kanandah 1" (AHIMS #23-4-0640) – is located around 390 metres south of the Project Area.

Archaeological predictions

A review of the existing archaeological and environmental context of the Project 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 Project Area's Aboriginal archaeological record are as follows:

- Considering the extent of past disturbances, identified stone artefacts encountered within the Project 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 watercourses, where levels of visibility are typically higher
- If present, Aboriginal archaeological materials within the Project Area would be of mid-to-late Holocene antiquity (approximately 7000 years before present day)
- The dominant raw material for flaked stone artefact production within the Project Area would be quartz, with silcrete the second most common material
- Flaked stone objects would be dominated by flake debitage items (Andrefsky, 2005), with formed objects (i.e. cores and retouched flakes) comparatively poorly represented
- Formal retouched tool types would be poorly represented in stone artefact assemblages.

9.3.4 Archaeological survey results

No Aboriginal archaeological sites or areas of Potential Archaeological Deposit (PAD) were identified during the survey of the Project Area. Vegetation comprised low-lying native *Sclerolaena* (Copper-burr) and *Maireana* (Bluebush) species, in addition to various weeds indicating that the Project Area had been subject to vegetation clearance.

The RAPs present during the survey identified two lithic items which they considered might potentially be artefacts. While neither item satisfies technical criteria for identification as a stone artefact, as a precautionary measure, both were moved outside of areas of potential ground surface disturbance by attending RAP field representatives. The location of the lithic items is shown in **Figure 9-1**.

Overall, survey within the Project Area identified a predominately disturbed landscape where topsoils have been graded and levelled. The RAPs present during the survey suggested that land within the Project Area has been subject to significant historic disturbances. Based on an observation of historic disturbances and landscape variables, the subsurface sensitivity of the Project Area was assessed as low.

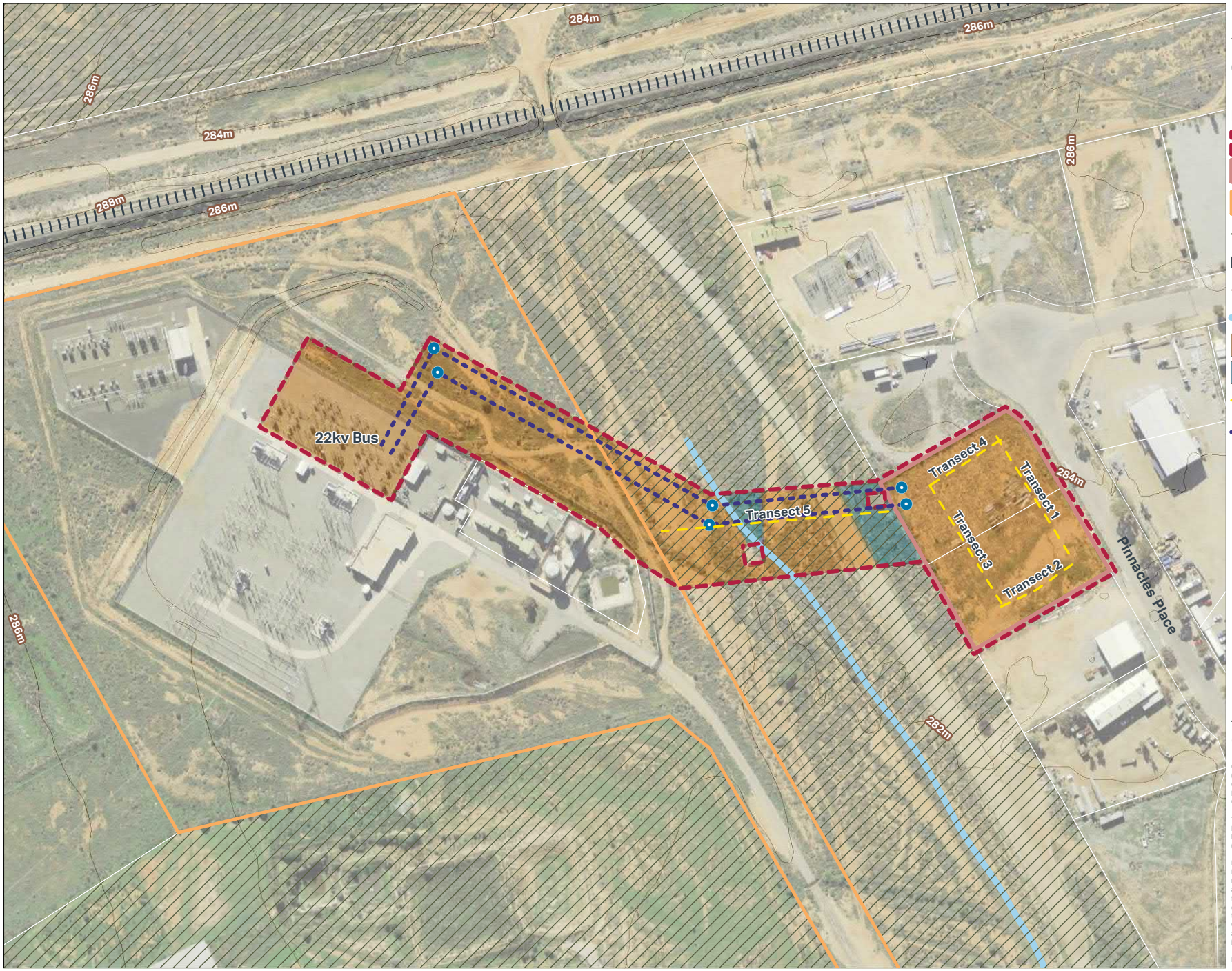
9.3.5 Cultural values

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).

No confirmed Aboriginal objects or specific social or cultural values were identified by RAPs during the assessment.

While no specific cultural values or confirmed Aboriginal objects were identified within the Project Area, RAPs noted that all artefacts are important for their contribution to information about how Wilyakali people moved, lived and demarcated the landscape. Management and mitigation measures to manage potential impact to Aboriginal items, if present, are provided in **Section 9.5**.

Although situated within a broader landscape of cultural significance for contemporary Wilyakali people, the Project Area itself is assessed as having low historical significance. No evidence of post-contact Aboriginal occupation has been identified within the Project Area. In addition, no historical records or oral histories specific to the use of the Project Area by Aboriginal people have been identified as part of the ACHAR. The Project Area is also considered to have low aesthetic significance on the grounds that the natural environment of the area has been extensively modified by historical land use practices, with RAPs noting the disturbed condition of the area.



AECOM

N

0 30 60 m

Legend

- Project Area
- Site
- TransGrid Broken Hill Substation
- Commons
- Railway
- Contour
- Ephemeral watercourse
- Disturbance - high
- Disturbance - low
- Survey Transects
- Indicative overhead transmission line
- Indicative transmission line pole

FIGURE 9-1:
ABORIGINAL HERITAGE CONSTRAINTS

Source: © Department of Customer Service 2020

9.4 Impact assessment

9.4.1 Construction

As identified in **Section 9.3.4**, no Aboriginal objects or areas of PAD were identified during the archaeological survey. The attending RAPs identified two lithic items which they considered might potentially be artefacts. These items do not satisfy technical criteria for identification as a stone artefact. Given that the Project Area excludes the locations of the lithic items, neither item would be impacted by the construction of the Project.

Notwithstanding, to avoid potential impacts to these items, the Project Area excludes the areas in which the items are located (refer to **Figure 9-1**). Further detail on the management approach to avoid potential impacts to these items is provided in **Section 9.5**.

9.4.2 Operation

The operation of the Project would not result in impacts to the lithic items identified during the archaeological survey, as the Project Area excludes the areas in which the items are located. Management and mitigation measures would be implemented to manage impacts to any previously unidentified Aboriginal objects, should they be encountered (refer to **Section 9.5**).

9.5 Management and mitigation measures

No Aboriginal heritage constraints have been identified within the Project Area. As such, no further investigation works, or reporting are proposed for the Project.

Management and mitigation measures that would be implemented for the Project to address potential impacts to Aboriginal heritage are listed in **Table 9-2**.

Table 9-2 Management and mitigation measures – Aboriginal heritage

ID	Management and mitigation measure	Timing
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 • 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,	Construction

ID	Management and mitigation measure	Timing
	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 of the Project, all work in the vicinity of the remains would cease immediately and the standard procedures set out in the NSW Police Force Handbook (2016); and NSW Health Exhumation of Human Remains Policy (2013) would be followed.	

10.0 Non-Aboriginal Heritage

10.1 Secretary's Environmental Assessment Requirements

Table 10-1 sets out the SEARs relevant to heritage and where the requirements have been addressed in this EIS.

Table 10-1 SEARs – Heritage

Relevant SEARs	
Heritage	**Where addressed**
This EIS must include: An assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the Formadevelopment, including consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents	An assessment of impacts to historic heritage (cultural and archaeological) is included in **Section 10.4**

10.2 Methodology

The non-Aboriginal heritage assessment involved:

- Identifying non-Aboriginal heritage items with the potential to be impacted by the 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 any identified items during construction and operation
- Identifying management measures to address potential impacts to non-Aboriginal heritage.

10.3 Existing environment

10.3.1 Historical context

European 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, about 500 kilometres east of Broken Hill. Six years later, in 1835, Major Thomas Mitchell led an expedition that largely followed Sturt's route north-west from Sydney but pushing past Sturt, explored the Darling River around Menindee Lakes, 100 kilometres south-east of Broken Hill, almost to its junction with the Murray River. In 1844, Charles Sturt led another 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 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 kilometres west of Broken Hill. This was the first recorded discovery of silver-bearing ore in the Barrier Ranges and became the "Pioneer Mine". Shortly after in 1880, gold was discovered at Mount Browne and Mount Poole, 200 kilometres 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 European pastoralists as “the broken hill” because of the rocky outcrop that was visible rising above the plains. The first mining lease was pegged in Broken Hill in 1883 by Charles Rasp, David James and James Poole. 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 connection 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).

Reference to Parish maps for Nadbuck indicates that the land within the Project Area was subject to two early grants, with the centre portion reserved for a roadway. Lots 57 and 58 of DP 258288 form part of a 21-hectare site referred to as ML 346 (mining lease). Lot 2 of DP 1102040, the existing TransGrid Broken Hill substation site, was originally recorded as Crown Reserve operated by the Electricity Commission of NSW.

Historical aerial photographs for the Project Area from 1982 to 2020 sourced from the NSW Spatial Collaboration Portal indicate a range of activities and associated ground surface impacts over time. These include:

- Vegetation clearance across the entire Project Area prior to 1982
- Commencement of construction of the TransGrid Broken Hill substation at Lot 2 of DP 1102040 in 1982
- Grading for various access tracks in and around the Project Area prior to 1982
- Road constructed through Lot 7302 of DP 1181129 prior to 2004
- Vegetation clearance and grading across Lots 57 and 58 of DP 258288 in 2010
- Vegetation clearance and further grading in part of Lot 58 of DP 258288, as well as grading within Lot 7302 of DP 1181129, in 2015.

10.3.2 Heritage items

A search of historic registers and lists was undertaken to identify heritage items within or in the immediate vicinity of the Project Area. The results of the searches are included in **Table 10-2**.

Table 10-2 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

One heritage item is relevant to the Project Area – 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.

The following statement of significance is provided on the National Heritage Listing for the City of Broken Hill which summarises its heritage values:

> *The City of Broken Hill has outstanding significance to the nation for its role in creating enormous wealth, for its long, enduring and continuing mining operations, and the community's deep and shared connection with Broken Hill as the isolated city in the desert, its outback landscape, the planned design and landscaping of the town, the regeneration areas and particularly the physical reminders of its mining origins such as the Line of Lode, the barren mullock heaps, tailings, skimps and slagheap escarpment and relict structures.*
>
> *It demonstrates the principal characteristics of a mining town in a remote location with extensive transport infrastructure and administrative connections to three state capitals and as a rare example of a place subject to Australia's complex Federal system where differing administrative, social and economic influences are expressed in both tangible and intangible forms. It has social significance for its residents as a place of community pride, endurance, and as a remote mining community resilient to major social and economic change. Broken Hill has strong social significance for all Australians as a place where great wealth was created, as well as strong group associations with the Barrier Industrial Council. It exhibits outstanding aesthetic characteristics as a city in an arid desert setting, as the subject of interest for Australian artists, poets, film makers, TV producers and photographers.*
>
> *It has significance as a place where outstanding technical achievement has occurred in refining ore for its minerals including the froth flotation process and the computer controlled on-stream analysis of slurries. Broken Hill is also important as a place of research potential to reveal further information on mineral deposits with its range of complex minerals, It is associated with persons of great importance to Australia's history, including Albert Morris (arid land regeneration), Charles Rasp (discoverer), Herbert Hoover (mining engineer), WL Baillieu, WS Robinson and MAE Mawby (industrialists), GD Delprat (metallurgist), Percy Brookfield and Eugene O'Neill (unionists). Broken Hill's association with the Barrier Industrial Council as a group is also important.*
>
> *The Broken Hill zinc-lead-silver ore deposit is one of the world's largest ore bodies and contains an extraordinary array of minerals. It is geologically complex and has national scientific significance. The Broken Hill operation is significant for its immense size and unrecorded mineral species continue to be found. It contributes to an understanding of the formation of the Australian continent and more than 2,300 million years of the earth's history.*

No other heritage items were identified within or in the immediate vicinity of the Project Area. The closest individually listed heritage item is located about 760 metres to the south-east of the Project Area (Old Broken Hill City Abattoir, an item of local significance listed under Schedule 5 of the Broken Hill LEP).

10.4 Impact assessment

10.4.1 Construction

The Project Area is located in an existing disturbed, industrial area outside of the Broken Hill city centre. As such, construction of the Project 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 Project Area, visual impacts to the listing would also be negligible (refer to **Section 17.1** for an assessment of the potential visual impacts associated with the Project).

In addition, no impacts are anticipated to individually listed heritage items, as the closest listed heritage item is located approximately 760 metres from the Project Area.

10.4.2 Operation

Similarly, with regard to the construction phase of Project, impacts to the heritage values of the City of Broken Hill listing are not anticipated during operation of the Project.

10.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential impacts to non-Aboriginal heritage are listed in **Table 10-3**.

Table 10-3 Management and mitigation measures – Non-Aboriginal heritage

ID	Management and mitigation measure	Timing
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

11.0 Soils, groundwater and contamination

11.1 Secretary's Environmental Assessment Requirements

Table 11-1 sets out the SEARs relevant to soils, groundwater and contamination and where the requirements have been addressed in this EIS.

Table 11-1 SEARs – Soils, groundwater and contamination

Relevant SEARs	
Hazards and risks	**Where addressed**
The EIS must include: An assessment of potential hazards and risks including but not limited to…land contamination.	Potential sources of contamination within the Site and receptors are identified in **Section 11.3.5**. Detailed analytical results of soil investigations are provided in **Appendix D Detailed Site Investigation (DSI) and Assessment** Potential contamination impacts during construction and operation are detailed in **Section 11.4.**
An assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts;	Potential impacts of the Project on groundwater resources during construction and operation are detailed in **Section 11.4. Section 11.5** outlines the management and mitigation measures proposed to manage potential impacts. Potential impacts to surface water are assessed in **Chapter 14.0 Surface water, flooding and water use.**

11.2 Methodology

A desktop review of the Project Area was completed to understand the existing ground conditions and the likely level of assessment required. This desktop assessment was informed by various database searches, aerial photos, site photos and site walkovers. During this assessment it was identified that different parts of the Project Area presented different levels of contamination risk.

The Site has been used for the storage of wastes and machinery and therefore could potentially be contaminated. As such a DSI and Assessment was completed for the Site that involved ground investigations.

Lot 7302 and the land on the TransGrid lot outside the main substation had not be subjected to industrial or other land uses and did not appear to have been previously developed or used. Therefore a desktop assessment was completed for the other parts of the Project Area given the low likelihood of contamination and the minimal intrusive works proposed.

The DSI and Assessment prepared for the Site is provided in **Appendix D Detailed Site Investigation and Assessment**. The objective of the DSI and Assessment was to identify and document contaminants of potential concern (CoPC) to inform future development works at the Site and evaluate the requirement for further assessment and/or management.

The DSI and Assessment involved:

- Undertaking a desktop review of available historic and current Site information, including:
    - Database searches, including NSW EPA, NSW Department of Planning, Industry and Environment, NSW Department of Primary Industries - Office of Water, and Commonwealth Scientific and Industrial Research Organisation (CSIRO) registers and databases, to assess elements of environmental inputs including historical use, land zoning, topography, geology, water resources, sensitive receptors
    - Review of historical aerial imagery
- Developing a preliminary Conceptual Site Model to identify CoPC, exposure pathways and potential receptors, to refine the proposed sampling for the contamination investigation
- Undertaking a soil investigation in January 2021 involved drilling six boreholes across the Site to identify the potential presence of groundwater and collecting and analysing soil samples for CoPC. Boreholes, stockpiles and fragments from which samples were obtained are shown in **Figure 11-1**
- Assessing the concentrations of CoPC against adopted site assessment criteria for the future land use of the Site, with consideration given to construction workers during the construction phase of the Project. The adopted site assessment criteria were determined with reference to the National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 2013)
- Updating the preliminary Conceptual Site Model based on the results of the soil investigation to assess potential risk to human health and ecological receptors in a commercial/industrial setting.

Given that the final location of the transmission line within the Project Area would be determined during detailed design, and as the areas where disturbance would occur are limited (e.g. transmission line poles), the DSI and Assessment did not involve inspecting or collecting samples within the transmission line corridor (i.e. outside of the Site). Notwithstanding, potential impacts within the transmission line corridor are discussed qualitatively in this chapter.

AECOM

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0 10 20 m

Legend

- Project Area
- The Site
- Indicative overhead transmission line
- Indicative transmission line pole
- Borehole
- Sample location
- Stockpile

FIGURE 11-1:
BOREHOLE AND SAMPLING LOCATIONS

Source: © Department of Customer Service 2020

11.3 Existing environment

11.3.1 Topography

The Site is relatively flat and slopes downwards slightly along a north-west to south-east gradient, from approximately 284 to 283 metres Australian Height Datum (AHD) across a distance of approximately 100 metres.

11.3.2 Geology and soils

According to the 1:250,000 geological sheet, the Project Area is located within the Precambrian aged Willyama Complex. The Atlas of Australian Soils indicates that the Project Area and surrounds are classified as Tenosol soil type – hilly with small valley plains. Soils within the Project 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 Project 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.

Field investigations did not identify any fill material within the Site. From a review of 2010 and 2020 aerial photographs, it is noted that the Site has been graded and cleared, which is evident from the re-worked surface materials observed on the Site during drilling.

Soils observed at the surface of borehole locations on the Site are described as natural red-brown soil and classified as a clayey silt. The grainy texture was characteristic of silt material. It displayed low plasticity when moistened. The soil layer ranged in depth from 0.9 metres below ground level to 0.2 metres below ground level across the Site.

11.3.3 Hydrology

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 Project 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 kilometres south of the Project Area. The channel drains in a southerly direction. It is likely that groundwater also drains in a southerly or south-easterly direction.

A search and review of the EPBC protected matters tool indicated that there are no wetlands of international importance within a 10 kilometre radius of the Site.

11.3.4 Hydrogeology

A review of the NSW Department of Primary Industries – Office of Water dataset indicates that there are no registered groundwater bores located within the Project Area and 13 registered groundwater bores within one kilometre of the Project 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 Site at less than two metres below ground level.

However, groundwater was not encountered during field investigations, which included drilling six boreholes up to eight metres below ground level. There were no observations of moisture in the soil and bedrock at any boreholes to depth. The likelihood for shallow groundwater to be present in the Site is considered to be low.

11.3.5 Soil and groundwater contamination

Historical review

Based on historical land use, reported activities carried out across the Site, database searches, key points relating to the identification of CoPCs are as follows:

- A Lot Search report for the Site (dated 17 December 2020) identified that there are two sites within one kilometre of the Project Area identified as being on the NSW EPA list of NSW contaminated sites notified to the EPA. These sites are over 800 metres away, and are located cross gradient and upgradient of the Project Area, respectively. No sites were identified on the NSW EPA Contaminated Land Records of Notice
- A review of relevant NSW EPA POEO Act licences identified that Perilya Broken Hill Limited holds a licence applicable to the area beneath the Site for mining for minerals, mineral processing, and crushing, grinding or separating. This licence is relevant to mining activities beneath the Project Area, rather than above-ground activities. Four licensed activities were identified within one kilometre of the Project Area. The licensed activities are generally located hydraulically up-gradient of the Site, except for Tronox Mining Australia Limited, which is located hydraulically down-gradient of the Project Area
- Six former licensed and now revoked or surrendered activities were identified within one kilometre of the Project Area. These activities are generally located hydraulically cross- or down-gradient of the Site, except for the Australian Vermiculture and Consolidate Plan and Quarries which are located upgradient. Most of the activities were undertaken over 15 years ago
- The Project Area and surrounds are located within four current mining and exploration titles. This includes two titles held by Perilya Broken Hill Limited, which apply beneath the Site (below-ground) for mining and exploration. There are 13 historical mining and exploration titles within one kilometre of the Project Area, of which three were located within the Project Area.

Contaminants of Potential Concern

To inform the field investigation and soil sampling, CoPC which may be present on the Site were identified. These included the following:

- Heavy metals may be present in fill of unknown origin and quality and due to mining activities in the town of Broken Hill. Common metal contaminants include arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc
- Petroleum hydrocarbons from historic storage and spills of fuels, solvents and oils may be present. Petroleum hydrocarbons are generally quantified by analytical laboratories as total petroleum hydrocarbons (TPH) and total recoverable hydrocarbons (TRH) and as four fractions of hydrocarbons grouped into ranges of volatility
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN), which are typically found in petroleum fuels and, to a lesser extent, diesel fuels
- Polycyclic Aromatic Hydrocarbons (PAHs) and Phenols related to some petroleum hydrocarbon use, waste and lubricating oils. PAH and phenols are also potentially present in bitumen/asphalt, creosote, ash and incompletely combusted materials
- Volatile Organic Compounds (VOCs) and Semi-volatile Organic Compounds (SVOCs). VOC compounds may contain monocyclic aromatic hydrocarbons (including BTEXN compounds) and volatile hydrocarbons (such as solvents potentially stored historically at the Site)
- Asbestos could potentially be present within materials of unknown origin and quality and from dumping of old building materials.

Field investigation results

During field investigations, observations of potential contamination were made, and soil sampling was undertaken to analyse samples for CoPC. The following observations were made:

- Waste materials such as metal, wood and tyre waste, and infrastructure, including truck drop trailers were present at the Site. The Site was also used for storage of vehicle fuels and oils in intermediate bulk containers, drums and jerry cans
- A small spill with a hydrocarbon odour was observed on the southern boundary of the Site from an intermediate bulk container. Staining was also observed in the soil directly adjacent to the intermediate bulk container. It is possible that the contaminant had spread to under some of the other dumped waste in proximity to the intermediate bulk container. The area of the spill and stain is referred to as the 'tank sample location' and is shown on **Figure 11-1**
- Two stockpiles were visible on Site. The material of the stockpiles appeared to be similar to that encountered in boreholes, and no observations of contamination were made for the surface of the stockpile. As such, soil sampling was not conducted at the stockpiles
- No visual or olfactory signs of contamination were observed in the soil samples at the six borehole locations investigated
- No fill material was identified during drilling works undertaken during field investigations.

Samples were taken at the locations shown on **Figure 11-1** and analysed for CoPC. The sampling found that no asbestos was detected in the fragment samples collected or in the soil samples analysed. All soil samples reported that the concentrations of the contaminants analysed were below the adopted human health and ecological assessment criteria for commercial industrial land use, with the exception of the tank sample location. Further detail on soil investigation results are provided in Section 9.3 of **Appendix D Detailed Site Investigation and Assessment**.

Localised petroleum hydrocarbon impacts (TRH at surface to 0.4 metres below surface level) were identified at the tank sample location that exceed the human health and ecological criteria for ongoing commercial and/or industrial land use (refer to NEPC, 2013). These impacts would be managed in line with a Remedial Action Plan for the excavation of localised petroleum hydrocarbon impacted material at this location (refer to **Section 11.5**).

Potential receptors

Based on the presence or absence of potential CoPC, the existing potential receptors of contamination impacts have been identified in **Table 11-2**. Both human health and ecological receptors have been considered.

Table 11-2 Potential receptors

Receptor	On-site	Off-site
Human health	• On-site workers and site users • Workers undertaking intrusive works during construction and operation	• Not applicable as no groundwater migration pathway has been identified in the DSI and Assessment • Dust migration not anticipated as no asbestos or lead detected in surface soils
Ecological	• Terrestrial soil environments	• Aquatic environment of the ephemeral creek located east of the Site

11.4 Impact assessment

11.4.1 Construction

Ground disturbance

Ground disturbance works during construction would include minor earthworks (refer to **Chapter 4.0 Project description** for further detail on construction methodology). Excavations within the Project Area would be to a maximum of 1.5 metres deep. Within the transmission line corridor, there would be up to three metre footing for the transmission line poles. No excavation would be required within the TransGrid Broken Hill substation compound.

Excavation and other earthworks, if not adequately managed, could result in the following impacts:

- Erosion of exposed soil
- Dust generation from excavation and vehicle movements over exposed soil
- Increase in sediment loads entering the stormwater systems and/or local runoff.

These may affect the quality of nearby sensitive environmental receptors, particularly downstream surface water environments and human receptors. Potential surface water impacts are discussed further in **Chapter 14.0 Surface water, flooding and water use**. Potential air quality impacts associated with dust generation during construction are discussed in **Section 17.5**.

Potential erosion and sedimentation impacts would be managed through soil and erosion controls implemented during construction and, as such, are considered to be negligible (refer to **Section 11.5**).

Soils and contamination

The identified CoPC were used to develop a Conceptual Site Model and to assess the potential for complete pathways where contaminants may impact a receptor. The complete Conceptual Site Model is provided in Section 10 **of Appendix D Detailed Site Investigation and Assessment**.

Potential disturbance of contaminated land during construction could result in impacts to the human health and ecological receptors identified in **Section 11.3.5**. Workers undertaking intrusive maintenance works on-site during construction would also be a potential receptor of contamination impacts.

Potential transport mechanisms for site-derived contaminants would include:

- Leaching of soil contaminants to surface water during heavy rainfall: contaminants may leach to surface water from surface soils and migrate via overland flow to the ephemeral creek east of the Site
- Vapour migration (on-site only): volatile contaminants may migrate as vapours through the subsurface and accumulate in structures or buildings occupied by workers.

The updated Conceptual Site Model identified potential complete pathways from direct contact with localised petroleum hydrocarbon impacted surface soils by on-site workers and off-site intrusive maintenance workers and ecological receptors within the vicinity of the tank sample location in the southern part of the Site. This potential contamination risk would be mitigated by excavating the contaminated soils and disposing of them off-site using a qualified contaminated material removalist. The process to excavate and manage these contaminated soils would be documented within a Remedial Action Plan (refer to **Section 11.5**). No potential complete pathways were identified in other areas on the Site.

There would also be potential for leaching of soil contaminants to surface water during heavy rainfall and off-site migration by overland flow to the ephemeral creek east of the Site. However, it is considered that total recoverable hydrocarbons (TRH) would volatilise and degrade over this distance and are, therefore, unlikely to present a risk to off-site human health and ecological receptors. Equally, the removal of contaminated soils in line with the Remedial Action Plan would ensure that the source of this potential impact would be removed as part of the Project.

Where excavation is required along the transmission line corridor, sampling would be undertaken to allow for waste classification (refer to **Section 11.5**). Potential contamination encountered would be managed through the CEMP for the Project, which would include measures to address unexpected finds of contamination (refer to **Section 11.5**).

As detailed in **Section 11.3.5**, based on the soil investigation and sampling, there are localised petroleum hydrocarbon impacts in surface and subsurface soils within the vicinity of the tank sample location that preclude the suitability of the Site for commercial/industrial land use in that location. However, the Site would be suitable for industrial use following proposed remedial works (refer to **Section 11.5**).

Accidental spills and leaks of fuels and oils from plant and equipment during construction would potentially result in unintentional contamination on-site and the potential for additional contamination to mobilise off-site. However, with the implementation of site management controls, the potential for accidental spills and leaks to occur during construction would be low.

The probability of occurrence of acid sulfate soils across the Project Area is considered to be extremely low (refer to **Section 11.3.2**). It is unlikely that the Project would result in any impacts relating to acid sulfate soils during construction.

Groundwater

Groundwater was not encountered during field investigations which involved drilling up to eight metres below ground level (refer to **Section 11.3.4**). Given that ground disturbance works would be up to 1.5 metres below ground level within the Site, and up to three metres below ground level within the transmission line corridor, it is unlikely that groundwater would be intercepted during construction of the Project. There would also be no changes to infiltration rates anticipated during construction. Therefore, the proposed construction works are not anticipated to result in impacts to groundwater.

11.4.2 Operation

Soils and contamination

The Project would be designed to avoid the risk of accidental leaks or spills occurring. Operations would be carried out in accordance with the maintenance protocols for the Site as described in **Chapter 16.0 Hazards and risk**. The Project is not anticipated to result in contamination impacts to the Project Area.

Groundwater

During operation, there would be an increase in impermeable surfaces at the Site. This would marginally reduce the area where infiltration to groundwater could occur. Run-off from the Site would be managed through installing a surface water management system (refer to **Chapter 14.0 Surface water, flooding and water use** for further details), which includes surface water run-off being discharged into Lot 7302 of DP1181129. The design for stormwater management system at the Site would be discussed with Council prior to being finalised (refer to **Section 14.5**).

11.5 Management and mitigation measures

Management and mitigation measures to address potential impacts related to contamination, soils and groundwater are provided in **Table 11-3**.

Mitigation measures in other chapters that are relevant to the management of soils, groundwater and contamination impacts include:

- **Chapter 14.0 Surface water, flooding and water use,** specifically measures which address erosion and sediment control and surface water management for the Site during construction and operation
- **Chapter 16.0 Hazards and risk,** specifically measures which address potential spills during construction and operation
- **Chapter 17.0 Other matters,** specifically measures which address waste and air quality management during construction and operation.

Table 11-3 Safeguards and management measures – Soils, contamination and groundwater

ID	Management and mitigation measure	Timing
C1	A Remedial Action Plan would be prepared in accordance with *State Environmental Planning Policy No 55 – Remediation of Land* 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. 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 • 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.	Construction
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 line corridor), samples of material would be collected to allow for waste classification in accordance with the NSW EPA (2014) *Waste Classification Guidelines*.	Construction

12.0 Noise and Vibration

12.1 Secretary's Environmental Assessment Requirements

Table 12-1 sets out the SEARs relevant to noise and vibration and where the requirements have been addressed in this EIS.

Table 12-1 SEARs – Noise and vibration

Relevant SEARs	
Noise	**Where addressed**
This EIS must include: An assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria	The Noise and Vibration Assessment (**Appendix E**) was undertaken in accordance with the guidelines identified in the SEARs. Construction noise and vibration impacts are discussed in **Section 12.4.1**. Operational noise and vibration impacts are discussed in **Section 12.4.2**. The potential for cumulative noise impacts is considered in **Section 17.6.** The assessment indicates that marginal exceedances of criteria are anticipated to occur at non-residential receivers during construction. These would be manageable with the implementation of standard mitigation measures (refer to **Section 12.5**). Exceedances are not predicted at residential receivers. As such, a draft noise management plan has not been included in the EIS. A commitment to the preparation of a Construction Noise and Vibration Management Plan has been included in **Section 12.5**.

12.2 Methodology

A Noise and Vibration Assessment has been undertaken for the Project to assess potential noise and vibration impacts during construction and operation of the Project. The complete report is attached in **Appendix E Noise and Vibration Assessment** with relevant sections summarised within this chapter.

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) and Assessing Vibration: A Technical Guideline (AVTG), 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)
- Identifying management and mitigation measures to manage the predicted noise and vibration impacts during construction and operation of the Project.

12.2.1 Policies and guidelines

The noise and vibration impact assessment has been completed with reference to the following policies and guidelines:

- NSW EPA ICNG (Department of Energy and Climate Change (DECC), 2009)
- AVTG (Department of Environment and Conservation (DEC), 2006)
- The German Standard DIN 4150 Part 3-2016 Structural vibration – Effects of vibration on structures (Deutsches Institute fur Normung, 1999). The German Standard has been used as no Australian standards currently exist for the assessment of building damage caused by vibration
- NSW NPfI (NSW EPA, 2017)
- RNP (Department of Environment, Climate Change and Water (DECCW), 2011).

12.2.2 Construction noise assessment approach

Construction noise

Construction noise impacts have been assessed in accordance with the ICNG. The ICNG identifies NMLs, which are Project-specific noise criteria used to help manage noise impacts at all receivers. NMLs are defined by existing ambient noise levels and the receiver's sensitivity to construction noise. NMLs are categorised for residential and other sensitive land uses.

The ICNG provides an approach for determining NMLs at residential receivers by applying measured background noise levels, which is reproduced in **Table 12-2**.

Noise levels resulting from construction activities are predicted at nearby noise sensitive receivers using environmental noise modelling software and compared to the NMLs.

Where an exceedance of the noise management levels is predicted, the ICNG advises that receivers can be considered 'noise affected'. Where construction noise levels at the receiver reach 75 A-weighted decibels (referred to as 'dB(A)'), residential receivers are considered to be 'highly noise affected'. If construction noise levels are predicted to exceed NMLs, potential noise impacts would be managed by implementing feasible and reasonable mitigation measures.

Table 12-2 Construction noise management levels – Residential receivers (DECC, 2009)

Time of day	NML, $L_{Aeq\ (15min)}$, dB(A)[1]	How to apply
Standard construction hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected: Rating background level (RBL) + 10 decibel (dB)	The noise affected level represents the point above which there may be some community reaction to noise: • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details
	Highly noise Affected: 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours • The proponent should apply all feasible and reasonable work practices to meet the noise affected level • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community

Sleep disturbance during construction

Construction works would be scheduled to be undertaken during recommended standard construction hours, with no night-time works scheduled. Noise generating equipment would not be utilised outside of standard construction hours. As such, the impacts of construction activities on sleep disturbance were not assessed.

12.2.3 Construction vibration assessment approach

When assessing vibration there are two components that require consideration: the potential for structural damage from vibration, and the potential for disruption to human comfort. The potential impacts during vibration intensive works have been assessed assuming a vibratory roller, piling rig or jackhammer could be used within the Project Area, as these would be the most vibration-intensive construction equipment utilised. Further detail on the criteria established for assessing construction vibration impacts is provided in the following sections.

Structural damage

The German Standard DIN 4150 provides recommended maximum levels of vibration, below which vibration is considered insufficient to cause building damage. These are referred to as 'structural damage safe criteria' and are presented in **Table 12-3**. In this assessment, DIN 4150 structural damage safe criteria have been adopted for residential and non-residential structures.

Table 12-3 Structural damage safe criteria (DIN 4150) for building vibration (Peak particle velocity)

Group	Type of structure	At foundation – Less than 10 Hertz (Hz)	At foundation – 10 Hz to 50 Hz	At foundation – 50 Hz to 100 Hz[1]	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Human comfort

AVTG has been applied to assess human exposure to vibration. The assessment of intermittent vibration outlined in AVTG is based on vibration dose values. The vibration dose value accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred vibration dose values for intermittent vibration arising from construction activities are listed in **Table 12-4**. The vibration dose value criteria are based on the likelihood that a person would comment adversely on the level of vibration over the entire assessment period.

Table 12-4 Preferred and maximum vibration dose values for intermittent vibration (m/s1.75)

Location	Daytime (7am – 10pm)		Night-time (10pm – 7am)	
	Preferred	Maximum	Preferred	Maximum
Critical areas (e.g. hospital operating theatres and precision laboratories where sensitive operations are occurring)	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops (e.g. automotive repair shops, manufacturing or recycling facilities)	0.8	1.6	0.8	1.6

12.2.4 Operational noise assessment approach

Operational noise was assessed in accordance with the NPfI. The NPfI sets out a procedure to determine project noise trigger levels to inform the noise level at which feasible and reasonable noise management measures should be considered.

The assessment procedure for industrial noise sources has two components that must be considered:

- Controlling intrusiveness noise impacts in the short term for residences; and
- Maintaining noise level amenity for residences and other land uses.

The NPfI provides recommended intrusiveness noise levels based on RBLs (which are identified in **Table 12-6**), and recommended amenity noise levels for different receiver types.

The project noise trigger level applies to environmental noise emissions from the Project. For residential receivers the project noise trigger levels represent the lower (i.e. more stringent) of the intrusive or amenity noise levels.

Sleep disturbance during operation

Potential sleep disturbance impacts during operation have been assessed with reference to the NPfI. The NPfI requires the potential for sleep disturbance to be assessed by considering maximum noise level events during the night-time period.

Where night-time noise levels from the Project at a residential location exceed the following screening levels, a detailed maximum noise level event assessment is required to be undertaken:

- $L_{Aeq,\ 15\ minute}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater.

Assessment receivers

Receivers considered for the construction noise assessment include all residential and non-residential buildings within a three-kilometre radius of the Project Area. This is considered a conservative assessment as it takes into account all buildings and aims to identify the number of exceedances of the construction NMLs.

Assessment receiver locations for the purposes of the operational noise assessment have been identified in **Table 12-5** and **Figure 12-1.** These have been selected as representative locations of the potentially worst affected receivers during operation of the Project. Demonstrating compliance with project noise trigger levels at these receivers is anticipated to result in compliance of the relevant criteria at receivers located further from both the Site and the Project Area.

Table 12-5 Operational noise assessment receiver locations

Receiver	Address	Land use classification
R1	101 Wentworth Road Broken Hill	Residential - Suburban
R2	32 Gaffney Street Broken Hill	Residential - Suburban
R3	29 Ryan Street Broken Hill	Residential - Suburban
R4	4 Ryan Street Broken Hill	Residential - Suburban
R5	46 Wills Street Broken Hill	Residential - Suburban
R6	141 Creedon Street Broken Hill	Residential - Suburban
R7	119 Pinnacles Road, Broken Hill	Residential - Rural
R8	121 Pinnacles Road, Broken Hill	Residential - Rural
E1	Rainbow Preschool	Educational
E2	Charles Sturt University	Educational
C1	Broken Hill Bowls Club	Commercial
C2	Service Station, Kanandah Road, Broken Hill	Commercial
I1	82 Pinnacles Place Broken Hill	Industrial
I2	17-19 Pinnacles Place Broken Hill	Industrial
IR1	38 Pinnacles Road Broken Hill	Industrial
A1	Broken Hill Bowls Club	Active recreation area

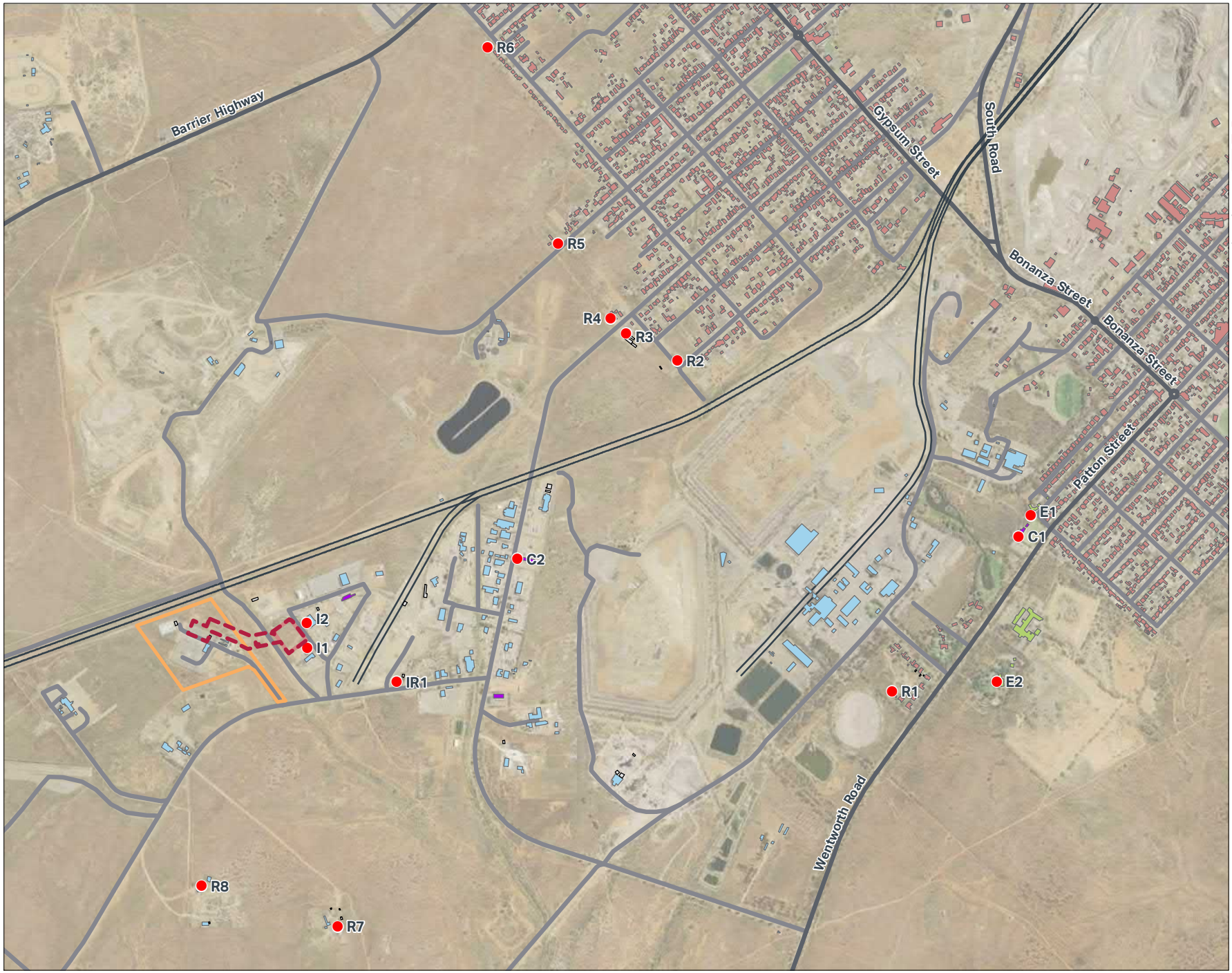
12.2.5 Traffic noise assessment approach

Construction and operational traffic noise were assessed with reference to the RNP, which provides the methodology for assessment and the threshold for noise mitigation.

To assess noise impacts from both construction and operational traffic generation by the Project, the RNP requires that an initial screening is undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB.

Where the predicted noise increase is 2 dB or less, no further assessment is required and noise mitigation at residential receivers is not required. Where the predicted noise level increase is greater than 2 dB, and the predicted road traffic noise level exceeds the road category specific criterion, noise mitigation is considered for those residential receivers affected.

The RNP does not require assessment of noise impact to commercial or industrial receivers.



AECOM

N

0 250 500 m

Legend

- Project Area
- Site
- TransGrid Broken Hill substation
- Main roads
- Local roads
- Railway
- Operational noise assessment receiver location

Receiver Type

- Commercial
- Education
- Industrial
- Residential
- Shed

FIGURE 12-1:
ASSESSMENT RECEIVER LOCATIONS

Source: © Department of Customer Service 2020

12.3 Existing environment

As described in **Chapter 2.0 Project area context and background**, the Project Area is situated within and adjacent to industrial land uses. The existing acoustic environment around the Project Area is dominated by road and rail traffic and industrial related sources. The nearest residential receiver is a rural residence located approximately 1.1 kilometres from the Project Area. The nearest residential area is approximately 1.6 kilometres to the north-east of the Project Area. Receivers within the vicinity of the Project Area are shown on **Figure 12-1**.

12.3.1 Estimated rating background levels

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 and summarised in **Table 12-6**.

Table 12-6 Rating background levels

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 12-6** 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 what is presented in **Table 12-6**.

12.4 Impact assessment

12.4.1 Construction

Based on the information presented in **Section 4.3**, the following construction phases have been considered in the noise assessment:

1. Enabling works
2. Civil, structural, mechanical, electrical works and commissioning
3. Demobilisation
4. Transmission connection.

This section considers the potential noise impacts to residential receivers, non-residential receivers, as well as potential construction vibration and traffic noise impacts.

Construction noise – residential receivers

Using the estimated rating background levels provided in **Table 12-6**, project-specific NMLs have been determined for all residential receivers within a three kilometre radius from the Project Area during construction. **Table 12-7** presents the NMLs applicable to the residential receivers within this three kilometre radius.

Table 12-7 Construction noise management levels – Residential receivers

Land use	Recommended standard hours RBL, L_{A90} dB(A)	Recommended standard hours noise management levels, $L_{Aeq\ (15\ min)}$ dB(A)	Highly noise affected level, $L_{Aeq\ (15\ min)}$ dB(A)
Residential	35	45	75

Table 12-8 presents the number of residential properties within a three-kilometre radius where the NMLs are likely to be exceeded.

Table 12-8 Number of residential buildings where noise levels may exceed NMLs

Phase	Exceedance of NML			Highly affected >75 dB(A)
	1-10 dB	11-20 dB	>20 dB	
Enabling works	0	0	0	0
Civil, structural, mechanical, electrical works and commissioning	0	0	0	0
Demobilisation	0	0	0	0
Transmission connection	0	0	0	0

As shown in **Table 12-8**, the construction phases and activities are expected to comply with the NMLs at all residential receivers within a three kilometre radius. No exceedances of NMLs are predicted to occur at residential receivers. By extension, none of the construction phases are expected to result in noise levels which exceed the 'highly noise affected' level of 75 dB(A) for residential receivers.

Construction noise – non-residential receivers

Using the estimated rating background levels provided in **Table 12-6**, project-specific NMLs have been determined for non-residential receivers within a three kilometre radius from the Project Area during construction. **Table 12-9** presents the NMLs applicable to these non-residential receivers.

Table 12-9 Construction noise management levels – Non-residential receivers

Land use	External noise levels, $L_{Aeq\ (15\ min)}$ (applies when properties are in use)
Classrooms at schools and other educational Institutions – internal	45 dB(A)
Classrooms at schools and other educational Institutions – external	65 dB(A)[1]
Active recreation areas	65 dB(A)
Passive recreation areas	60 dB(A)
Industrial premises	75 dB(A)
Commercial premises (including cafes, bars, restaurants, retail stores and hotels)	70 dB(A)

Notes:

1. *This external noise management level is based upon a 45 dB(A) internal noise management level and a 20 dB(A) reduction from outside to inside through a closed window*

Table 12-10 presents the number of non-residential properties within a three-kilometre radius where the NMLs are likely to be exceeded.

Table 12-10 Number of non-residential buildings where noise levels may exceed NMLs

Phase	Exceedance of NML		
	1-10 dB	11-20 dB	> 20 dB
Enabling works	3	0	0
Civil, structural, mechanical, electrical works and commissioning	3	0	0
Demobilisation	3	0	0
Transmission connection	0	1	0

Construction phases and activities are generally expected to comply with the noise management levels at non-residential receivers, noting that some minor exceedances are predicted to occur.

These exceedances are generally within the 1-10 dB exceedance band, and therefore considered a minor impact. Exceedances within the 1-10 dB exceedance band are limited to industrial premises located on Pinnacles Place. These exceedances are predicted to occur during the first three phases of construction. Given that the assessment approach is conservative by assuming that all equipment in each construction phase is operating at once, these predicted exceedances are considered to present a worst-case scenario. The predicted impacts would be temporary in nature, with the enabling works planned to commence in late 2021, and construction to be finished in late 2022 (refer to **Section 4.3** for further detail on the construction program). Noise mitigation measures would be implemented to manage potential impacts, including consultation with industrial premises on Pinnacles Place about the nature, duration and impact.

One exceedance within the 11-20 dB band is predicted to occur at the TransGrid Broken Hill Substation during the transmission connection phase. As noted above, the assessment assumptions are conservative. Works to complete the transmission line connection would progressively move along the transmission line corridor, with impacts to workers within the substation expected to last for a period of a few weeks. The substation is typically unoccupied, and it is unlikely that workers would regularly be present. Notwithstanding, TransGrid would be consulted with to manage any potential noise impact.

Potential construction noise impacts to the non-residential receivers would be managed through the implementation of mitigation measures that would be documented within a Construction Noise and Vibration Management Plan (CNVMP) for the Project (refer to **Section 12.5**).

Construction vibration

During construction, the most vibration-intensive equipment proposed to be used would include a vibratory roller, piling rig and jackhammer. With the implementation of minimum working distances of these items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. The separation distance between the Project Area and the nearest receivers is sufficient for vibration levels to be compliant with both the human comfort and cosmetic damage criteria.

Construction traffic noise

Construction of the Project is expected to be undertaken in phases. Each phase would require trucks to deliver materials, including concrete to the Project Area as well as the use of light vehicles carrying construction workers. To assess the impact of construction traffic it has been assumed that up to 20 heavy vehicles and 50 light vehicles would access the Project Area during peak construction periods.

Construction vehicles are proposed to access the Project Area from Pinnacles Road via the Barrier Highway (further detail on access routes is provided in **Chapter 13.0 Transport and access**). The existing traffic volume of the Barrier Highway is approximately 650 vehicles during the day and 70 vehicles at night, based on results from the Transport for NSW permanent classifier (ID:T0236) located on the Barrier Highway.

Taking into consideration the existing traffic volumes on the Barrier Highway, construction traffic to the Project Area is predicted to increase noise levels by less than 1 dB. Therefore, the traffic impact on residential receivers would be minimal and would comply with the Project acoustic requirements. Given that the increase in noise levels would be less than 2 dB, in accordance with the RNP, noise mitigation at residential receivers would not be required to mitigate construction traffic noise impacts.

Conclusion

Overall, construction noise and vibration impacts would be limited and would not impact residential receivers. The assessment indicates that marginal exceedances of criteria are anticipated to occur at non-residential receivers during construction. With the implementation of minimum working distances of high impact items of equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. Furthermore, the potential traffic noise impact on residential receivers would be negligible. Potential construction noise and vibration impacts of the Project would be limited and manageable with the implementation of standard mitigation measures (refer to **Section 12.5**). A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP to manage potential impacts during construction.

12.4.2 Operation

Operational noise

Based on the rating background levels in **Table 12-6**, the project noise trigger levels which have been adopted in this assessment are provided in **Table 12-11**.

Table 12-11 NPfI project noise trigger levels

Type of receiver	Time of day[1]	Intrusiveness noise level (RBL+5) ($L_{Aeq, 15\ minutes}$), dB(A)	Project amenity noise level ($L_{Aeq, 15\ minutes}$), dB(A)	Project noise trigger level ($L_{Aeq\ 15\ minutes}$), dB(A)
Suburban residential receivers	Day	40	53	40
	Evening	35	43	35
	Night	35	38	35
Rural residential receivers	Day	40	48	40
	Evening	35	43	35
	Night	35	38	35
School classroom – Internal	Noisiest 1-hour	-	38	38
School classroom – External	Noisiest 1-hour	-	58	58
Active recreation area	When in use	-	53	53
Commercial premises	When in use	-	63	63
Industrial premises	When in use	-	68	68
Isolated residence within Industrial zone	When in use	-	68	68

Notes:

1. *Day is defined as 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and public holidays.*
   Evening is defined as 6pm to 10pm Monday to Sunday and public holidays.
   Night is defined as 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and public holidays.

During operation, noise sources from the Project would include the batteries, inverters and transformers. In order to assess a reasonable worst-case operational scenario, it has been assumed that all of the proposed equipment within the Site would operate at full capacity, 24 hours a day, seven days a week, however this would not be representative of the typical operating regime. Operational noise levels during standard and noise enhancing meteorological conditions (i.e. adverse weather conditions such as wind from the Project Area toward receivers) during the night-time were assessed.

The predicted noise levels at each of the receivers (identified in **Table 12-5**) during a reasonable worst-case operational night-time scenario are presented in **Table 12-12**.

Table 12-12 Predicted operational noise levels (night-time)

Receiver	Project noise trigger levels, $L_{Aeq,15minute}$, dB(A)	Predicted noise level, $L_{Aeq,15minute}$, dB(A)			Compliance	
		Standard met conditions	Noise enhancing met conditions[1]	Temperature Inversion	Exceedance	Yes/ No
R1	35	15	18	18	-	Yes
R2	35	21	24	24	-	Yes
R3	35	16	19	19	-	Yes
R4	35	20	23	23	-	Yes
R5	35	19	22	22	-	Yes
R6	35	14	17	17	-	Yes
R7	35	26	29	29	-	Yes
R8	35	28	30	30	-	Yes
E1	58	12	15	15	-	Yes
E2	58	13	16	16	-	Yes
C1	63	13	15	15	-	Yes
C2	63	25	27	27	-	Yes
I1	68	58	59	59	-	Yes
I2	68	54	55	55	-	Yes
IR1	68	38	40	40	-	Yes
A1	53	13	15	15	-	Yes

Notes:

1. Adverse weather considers the worst case of 3 m/s source to receiver wind and temperature inversions.

The predicted operational noise levels indicate that under both standard and noise enhancing meteorological conditions, the operation of the Project would comply with the day, evening and night-time project noise trigger levels at all of the receivers. Therefore, impacts to receivers during operation of the Project would be negligible.

Sleep disturbance

Based on the estimated background noise levels during the night (as identified in **Table 12-6**), the sleep disturbance trigger levels for the residential receivers are presented in **Table 12-13**.

Table 12-13 Night-time sleep disturbance trigger levels

Type of receiver	Estimated night period RBL, L_{A90} dB(A)	Sleep disturbance screening noise trigger levels	
		$L_{Aeq, 15\ minute}$, dB(A)	L_{AFmax}, dB(A)
Residential	30	45	52

Given that the sleep disturbance criterion is 10 dB less stringent than the project noise trigger level used in the assessment in **Table 12-12**, compliance with the project noise trigger level would result in compliance with the sleep disturbance criteria. As such, the operation of the Project is not expected to result in sleep disturbance impacts.

Operational traffic noise

During operation, it is expected that up to three light vehicles would access the Site per day. Heavy vehicles are not anticipated to regularly access the Site during operation. Based on the background traffic volumes on the Barrier Highway, the operational traffic to the Site is predicted to increase noise levels by less than 0.1 dB. Therefore, the traffic noise impact on residential receivers would be negligible and would comply with the Project acoustic requirements. Given that the increase in noise levels would be less than 2 dB, noise mitigation at residential receivers would not be required to mitigate construction operational noise impacts.

Conclusion

Overall, potential noise and vibration impacts during operation of the Project would be negligible. The predicted operational noise levels indicate that under both standard and noise enhancing meteorological conditions, the operation of the Project would comply with project noise trigger levels at all of the receivers. Given the low operational traffic proposed, potential operational traffic noise impact would also be negligible.

12.5 Management and mitigation measures

Management and mitigation measures that would be implemented to minimise potential noise and vibration impacts during construction of the Project are provided in **Table 12-14**.

Given that operational noise and vibration impacts are anticipated to be negligible, management and mitigation measures have not been identified for the Project during operation.

Table 12-14 Management and mitigation measures – Noise and vibration

ID	Management and mitigation measure	Timing
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	Construction

ID	Management and mitigation measure	Timing
	• Provisions for consultation with TransGrid about managing potential noise impacts to on-site workers (if present) during the transmission line connection works • Provision for consultation with adjacent industrial premises about the nature and duration and of noise impacts.	
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 approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective.	Construction

13.0 Transport and access

13.1 Secretary's Environmental Assessment Requirements

Table 13-1 sets out the SEARs relevant to transport and access and where the requirements have been addressed in this EIS.

Table 13-1 SEARs – Transport and access

Relevant SEARs	
Transport	**Where addressed**
This EIS must include: An assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail	Construction traffic impacts are assessed in **Section 13.4.1** and operational traffic impacts are assessed in **Section 13.4.2**. Transport of material by rail is not proposed and therefore has not been considered in the assessment.
An assessment of the likely transport impacts to the site access route (including Pinnacles Road, Pinnacles Place and any temporary access proposed from the adjacent Crown land) and site access point, particularly in relation to the capacity and condition of the roads	Potential impacts to the site access route, secondary access points, road capacity and condition of the roads are assessed in **Section 13.4.1**.
A cumulative impact assessment of traffic from nearby developments	The potential for cumulative traffic impacts from nearby developments is assessed in **Section 17.6**.
A description of any proposed road upgrades (including temporary roads) developed in consultation with the relevant road and rail authorities (if required)	Construction vehicle access arrangements are discussed in **Section 13.4.1** and **Section 4.3.5**. Road upgrades or the construction of temporary roads are not required for the Project, as existing roads would be used to access the Project Area.
A description of the measures that would be implemented to mitigate any transport impacts during construction	Management and mitigation measures are included in **Section 13.5.**

13.2 Methodology

A traffic and access impact assessment has been undertaken for the Project to assess potential transport impacts during the construction and operation of the Project. The complete report is attached in **Appendix F Traffic and Access Impact Assessment** with relevant aspects summarised within this chapter.

The traffic and access impact assessment 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 (refer to **Section 13.3.1**), 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 following guidelines were considered during the preparation of the traffic and access impact assessment:

- Guide to Traffic Management – Part 3: Traffic Studies and Analysis (Austroads, 2020)
- Guide to Traffic Generating Developments Version 2.2 (RTA, 2002)
- Technical Direction TDT2013/4a – Guide to Traffic Generating Developments (Roads and Maritime Services, 2013)
- Guide to Traffic Management – Part 12: Integrated Transport Assessments for Developments (Austroads, 2020) and the complementary Roads and Maritime Supplement (RMS Austroads Guide Supplements, RMS, 2013).

These guidelines provide an overview of available methods for undertaking transport studies and analyses, aspects of traffic generation considerations relating to developments, and guidance on identifying, assessing and mitigating traffic impacts.

13.3 Existing environment

13.3.1 Road network

Key roads

The Site, and the wider Project Area, is located on the western side of Pinnacles Place. Pinnacles Place provides local access to the adjoining industrial precincts and local land uses and connects to the wider road network via Pinnacles Road.

An overview of the key roads and land use features surrounding the Site is shown in **Figure 4-2** (refer to **Chapter 4.0 Project description**).

Key roads within the vicinity of the Project Area include:

- **Pinnacles Place** – a local north-south loop road adjacent to the eastern boundary of the Site. This road provides access to the 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.
- **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.
- **Kanandah Road** – a regional north-south road, that connects with Pinnacles Road close to its mid-point, Creedon Street and Ryan Street in the north and Silver City Highway (B79) in the south. The road has a divided carriageway, providing one lane in each direction. No parking or footpaths are provided on either side of the road.

- **Creedon Street** – a north-south collector road located east of the Project Area, connecting to Barrier Highway in the north and Kanandah Road in the south. The road has a divided carriageway, configured with one lane in each direction. Parking is provided on either side of the road. Footpaths are generally provided on one or both sides of the road.
- **Silver City Highway (B79)** – a State Road generally running north-south and located east of the Project Area. It connects with Kanandah Road and runs through the Broken Hill city centre. Near Kanandah Road, the carriageway is divided, providing one lane in each direction with a short lane into Kanandah Road in the northbound direction. Silver City Highway intersects with Barrier Highway at Lodide Street in the Broken Hill city centre. No parking or footpaths are provided on either side of the road.
- **Barrier Highway (A32)** – a State Road generally running in the east-west direction north of the Project Area, connecting Adelaide to Dubbo and Sydney and running through the Broken Hill city centre. The highway is configured with one lane in each direction, within a divided carriageway. Within the city centre, parking and footpaths are generally provided on both sides of the road.

Traffic demand

East of the Project Area

Traffic demand east of the Project Area has been obtained from the TfNSW permanent classifier location on the Barrier Highway, about 15 kilometres north-east of the Project Area, and east of the Broken Hill city centre. Given the regional nature of the Project Area, it is concluded that the traffic flows observed at this permanent classifier location will be representative of the traffic levels in the Project Area.

Historical annual average daily traffic (AADT) growth patterns have been determined from information collected at the classifier on the Barrier Highway. This information is presented in **Table 13-2**. These traffic flows take into account holiday and seasonal variations and provide an accurate representation of background traffic flows throughout the year.

Table 13-2 Historical AADT growth trends near the Project Area (Source: Transport for NSW, 2021)

Direction	Vehicle type	Annual average daily traffic (AADT)[1]										
		2010	2011	2012	2013[2]	2014[2]	2015	2016[2]	2017	2018	2019	2020
Eastbound	Light vehicles	222	234	215	-	-	211	-	209	214	246	199
	Heavy vehicles	99	102	93	-	-	93	-	97	106	106	100
Westbound	Light vehicles	225	237	224	-	-	193	193	197	204	231	184
	Heavy vehicles	102	106	106	-	-	109	103	108	119	119	113
Combined	Light vehicles	447	471	439	-	-	404	-	406	418	477	383
	Heavy vehicles	201	208	199	-	-	202	-	205	225	225	213

1. Station ID BKHSTC is a permanent classifier and the AADT shown is in vehicles.
2. Traffic flows for 2013 and 2014 are not available for both directions while traffic flows for 2016 are not provided for the westbound direction.

A review of the historical AADT data presented in **Table 13-2** indicates that the average annual increase in background traffic along Barrier Highway over the last five years (excluding 2020) is around 4 per cent.

Road network performance

The existing year 2021 traffic volumes, as estimated on the Barrier Highway west of Broken Hill city centre near the Project Area, are low (less than 800 AADT). The Broken Hill Solar Power Plant Environmental Assessment report (AGL, 2012) indicates the Barrier Highway is designed to accommodate approximately 1,500 vehicles per day. As the Barrier Highway has very low existing AADT and is operating well below capacity, no intersection modelling was deemed required for this assessment to assess road network performance.

Road safety

A review of TfNSW crash and casualty statistics for the Broken Hill LGA for the four-year period between 2015 and 2019 indicates that only a small proportion of crashes in the LGA occurred near the Project Area. During this period, one crash occurred on Kanandah Road, north of Pinnacles Road, resulting in moderate injury and involved vehicles travelling in opposing directions. Two non-casualty crashes occurred at the intersection of Creedon Street and Barrier Highway. A larger proportion of crashes occurred within the Broken Hill city centre on both the State roads and the local network traversing the city centre.

13.3.2 Public transport

The Project Area has limited public transport services due to the low population density, current land uses and consequently low demand for public transport services. There are no train stations or bus stops in the immediate vicinity of the Project Area.

The Broken Hill city centre public transport network comprises rail and bus services connecting the surrounding town centres and Sydney. Regional trains and coaches operate from Broken Hill Station and the city centre, respectively. Buses also operate within the city centre, serving the local catchments.

13.3.3 Active transport

There are limited walking and cycling facilities in the immediate vicinity of the Project Area. Given the nature of the land uses surrounding the Project Area (primarily consisting of industrial land uses with some low-density residential areas), the provision of footpaths is limited. There are no existing cycling facilities available near the Project Area. Walking and cycling facilities are primarily provided within the Broken Hill city centre.

13.4 Impact assessment

13.4.1 Construction

This section details the following considerations during construction of the Project:

- The likely construction haulage routes
- The volumes of heavy and light vehicles which would access the Project Area per day
- Potential impacts to the performance of the surrounding road network
- Potential impacts to parking availability and access to nearby properties
- Potential impacts to road safety as a result of additional vehicles on the road network during construction
- Potential impacts to public transport services and active transport (pedestrian and cyclist) routes.

Construction haulage routes

During construction, vehicles are likely to access the Project Area from Pinnacles Place via Pinnacles Road, which would be accessed via Kanandah Road, Creedon Street and the Barrier Highway. These nominated roads are approved B-double routes which provide clearances and sufficient road widths to accommodate larger vehicles. Construction traffic would generally utilise the intersection of Barrier Highway/Creedon Street to access the Project Area. The proposed construction haulage route is shown in **Figure 4-2** (refer to **Chapter 4.0 Project description**).

The proposed haulage route would be used by the majority of heavy vehicles associated with the Project, which are proposed to arrive from Adelaide (to the west of the Project Area). Light vehicles carrying construction workers would likely be split across a number of routes, including from the Broken Hill city centre (to the east of the Project Area) as well as the identified haulage route.

In order to assess worst-case impacts along the construction haulage route, it has been assumed in the assessment that all construction vehicles associated with the Project would utilise this route and arrive from Adelaide.

Construction traffic volumes

Traffic generated by construction vehicles, including construction trucks and construction workers, is expected to be low given the nature of the construction of the Project, and would likely fluctuate depending on the Project construction phase. The following maximum vehicle numbers are anticipated during construction:

- Up to 50 construction workers per day accessing the Project Area during peak construction periods of the Project 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 are anticipated on average to access the Project Area during the construction period.

Road network impacts

Construction of the Project is expected to commence late 2021 and take approximately 12 months to complete. As such, it is assumed that peak construction would occur in 2022. The traffic flows for the peak construction year in 2022 without the Project construction traffic were based on the existing traffic flows determined for 2021 plus four per cent (as outlined in **Section 13.3.1**).

The anticipated peak background traffic flows in 2022 without the Project are presented in **Table 13-3**.

Table 13-3 Predicted 2022 peak construction traffic flows on the Barrier Highway west of Broken Hill

Year	AADT[1]	AM Peak (8am-9am)	PM Peak (3pm-4pm)
2022	787	54	63

1. AADT shown is in vehicles.

In order to consider a worst-case scenario for assessing the construction traffic impacts, it has been assumed that all construction worker vehicles would arrive during the same peak hour. However, given that the construction works are proposed to commence at 7am and finish at 6pm, the peak construction period of the Project would not likely coincide with the road network peak. As such, it is unlikely that light vehicles related to the construction of the Project would significantly impact the local road network during or outside peak hours.

In addition, as the majority of construction workforce is likely to be sourced locally, shuttle buses would be considered to transport construction workers from the city centre to the Project Area, further reducing potential impacts of the Project on the surrounding road network.

On a typical day, given that construction activities are proposed to be carried out over 11 hours per day and assuming construction heavy vehicle movements are equally distributed across the day, around two heavy vehicles would be expected to access the Project Area during peak hours. As such, traffic impacts generated from heavy vehicle construction traffic would be negligible.

No temporary diversions are proposed to accommodate the construction of the Project. If required, the potential locations of temporary diversions would need to be identified through a Construction Traffic Management Plan (CTMP). Road Occupancy Licences (ROL) and Traffic Control Plans (TCP) would also be prepared, as required.

Given that the construction haulage routes are approved B-double routes, they are considered to be in an appropriate condition to accommodate construction traffic associated with the Project. In addition, the traffic volumes associated with the Project construction are low and temporary, and therefore the Project is not anticipated to have a significant impact on the condition of existing haulage routes.

Access and parking

Some short-term localised impacts have the potential to occur at the access to the Project Area off Pinnacles Place in the form of delays to road users. These potential impacts would be temporary and localised, and likely only affect one road user at a time due to the low traffic levels on Pinnacles Place.

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

Accesses, including the main access off Pinnacles Place would be reviewed during subsequent design stages to ensure construction vehicles can safely enter the Site and turning paths can safely be accommodated on Site.

Construction workers would use the off-street parking along Pinnacles Place near the Project Area.

It is proposed that the construction workforce would mostly be sourced locally where available and feasible. Shuttle buses would be considered to pick up and drop off construction workers to limit car parking impacts on the road network immediately surrounding the Site.

Overall, the Project is anticipated to have a minor impact on car parking availability on Pinnacles Place.

The Project would not impact access to other properties near the Project Area during the construction.

Road safety

The review of crashes on the road network immediately surrounding the Project Area that are likely to be used for access by construction vehicles indicates that there is a low incident rate. Nevertheless, there remains a risk of construction vehicles interacting with pedestrians, cyclists and motorists on the road network surrounding the Project Area, including when construction vehicles are entering and exiting the Project Area. Measures would be included within a CTMP to manage the safe ingress and exit of vehicles from the Site onto Pinnacles Place and, when necessary, the emergency access point onto the unsealed road to the west (refer to **Section 13.5**).

Public transport

Bus services in the vicinity of the Project Area are unlikely to be impacted during construction. Bus services at the Broken Hill city centre would continue to operate as normal during construction activities and bus routes would not be impacted during the construction of the Project, given construction activities would be limited within the Project Area. No changes to bus stop locations are anticipated as a result of the Project Area.

In addition, haulage of construction materials to the Project Area by rail is not anticipated during the construction of the Project. As such, no impacts are anticipated on the rail network near the Site.

Active transport

During construction, works would be undertaken in a manner to ensure pedestrian and cyclist routes around the Project are maintained. However, given there are no existing walking or cycling facilities bordering the Project Area, temporary disruptions are not anticipated. Therefore, the Project is not anticipated to impact the operation of existing cycling or walking facilities.

Appropriate signage, line marking and/or traffic controllers would be positioned to notify pedestrians and cyclists of temporary arrangements. Impacts during construction would be managed through the development of a CTMP. The community would be notified in advance of planned works which would impact pedestrian or cycle infrastructure.

13.4.2 Operation

The Project is anticipated to require around three staff members during operation. Heavy vehicles are not anticipated to regularly access the Site during operation, with heavy vehicle access only required for maintenance work or battery unit replacements, should this be required. As such, it is anticipated that traffic generation would be low during operation of the Project, resulting in limited impacts on the road network surrounding the Project.

Approximately three car parking spaces would be provided once the Project is operational. Given that between one and three full time employees would be present on-site, the amount of parking proposed to be provided for the Project is considered appropriate. As such, the Project is not forecast to impact the availability of parking in the local area.

13.5 Management and mitigation measures

Table 12-14 outlines the management and mitigation measures that would be implemented to manage transport and access impacts during construction of the Project.

Given that no operational impacts are likely due to low staffing requirements, management and mitigation measures have not been identified for the Project during operation.

Table 13-4 Management and mitigation measures – Transport and access

ID	Management measure	Timing
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

14.0 Surface water, flooding and water use

14.1 Secretary's Environmental Assessment Requirements

Table 14-1 sets out the SEARs relevant to water and where the requirements have been addressed in this EIS.

Table 14-1 SEARs – Surface water, flooding and water use

Relevant SEARs	
Water	**Where addressed**
This EIS must include: An assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts	**Section 14.4.1** identifies the potential impacts of the Project during construction and **Section 14.4.2** identifies the potential impacts during operation on surface water (including flooding). **Section 14.5** outlines the management and mitigation measures proposed to manage these impacts. Potential impacts of the Project to groundwater resources have been discussed in **Chapter 11.0 Soils, groundwater and contamination**
Details of water requirements and supply arrangements for construction and operation	**Section 14.4.1** details the water use and supply arrangement during construction and **Section 14.4.2** details the water use and supply arrangements during operation.
A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004)	**Section 14.5** outlines the management and mitigation measures relating to surface water, flooding and water use and details the erosion and sediment control measures proposed for the Project. Management and mitigation measures relating to erosion and sediment control are included in **Section 14.5** and **Section 11.5**. This includes the preparation of a soil and water management plan in accordance with the *Managing Urban Stormwater: Soils & Construction* (Landcom, 2004) (referred to as the 'Blue Book').

14.2 Methodology

A surface water, flooding and water use assessment has been undertaken for the Project to assess the potential surface water, flooding and water use impacts during construction and operation of the Project. While the assessment includes the whole Project Area, focus has been placed on the Site as the majority of surface water, flooding and water use impacts are anticipated to occur as a result of the BESS construction.

The complete report is attached in **Appendix G Surface water assessment** with relevant sections summarised within this chapter. A Stormwater Management Design (AECOM, 2021) has been prepared to inform the surface water assessment and is included in Annex A of **Appendix G**.

The approach for assessing the potential impacts on surface water, flooding and water use included:

- A desktop review and analysis of existing information to characterise the existing environment, identify surface water receptors, existing flood behaviours and drainage infrastructure
- Consideration of the location of the Project Area in the context of surrounding catchment areas and potential sensitivity and influence on downstream waterways

- Identification of key topographical features such as likely overland flow paths and low/sag points around the Project Area
- Undertaking of modelling to determine the existing environment and potential impacts relating to surface water, flooding and water use within the Project Area, including:
  - DRAINS modelling to estimate peak flows generated by surrounding catchments
  - Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling to identify the potential pollutant production resulting from the Project
- Assessment of potential construction and operational impacts relating to flooding, drainage and surface water, including drainage modelling and water use
- Identification of appropriate mitigation and management measures to mitigate potential impacts on the environment.

The assessment draws on a number of data sources and reference documents, which include:

- Elevation data in the form of a Digital Elevation Model (DEM) at a resolution of 1 metre, obtained from the NSW Government Spatial Services
- The Urban Stormwater Master Plan for Broken Hill (Tonkin, 2006)

This chapter has also been prepared in consideration of the following guidelines and policies:

- *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom, 2004) and *Volume 2A* (DECC, 2008) (the 'Blue Book')
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018)
- *NSW (MUSIC) Modelling Guidelines* (Greater Sydney Local Land Services, 2015)
- *Australian Rainfall and Runoff* (Commonwealth of Australia, 2019) (ARR)
- *Australian Rainfall and Runoff* (Engineers Australia, 1987)
- *Broken Hill Development Control Plan 2016*
- *Broken Hill Stormwater Drainage Systems Policy 1995*
- *Aquifer Interference Policy 2012*
- *Guidelines for Controlled Activities on Waterfront Land 2018.*

14.3 Existing environment

14.3.1 Catchment

The Project Area is located within an industrial precinct with an ephemeral drainage line running north to south located on Lot 7302 DP 1181129 separating the Site from the TransGrid Broken Hill substation. Flow within the ephemeral drainage line passes through a culvert crossing under Pinnacles Road and heads south, eventually joining into Kelly's Creek, approximately 3.5 kilometres south of the Project Area. The central channel of Kelly's Creek is located 5.5 kilometres south of the Project Area and later feeds into Pine Creek, approximately 11 kilometres south west of the Project Area.

The Site drains in a south-westerly direction away from Pinnacles Place and towards the ephemeral drainage line. There is an unsealed vehicle access road that runs along the Lot 7302 DP 1181129 situated between the Site and the ephemeral drainage line. This road catches any runoff coming from the Site (and neighbouring properties) and carries it in a southerly direction, before eventually draining directly into the ephemeral drain where the unsealed access road meets Pinnacles Road.

Flows coming from areas upstream of the Project Area are captured by the local road network around Pinnacles Place, which then directs flow towards Pinnacle Road before discharging to the ephemeral drainage line. This prevents any upstream flows from moving through the Site.

The catchment contributing to flow along the ephemeral drainage line as it passes through the transmission line corridor (i.e. the remaining portion of the Project Area) is estimated to be in the order of 2.7 square kilometres and extends up to Wills Street. The upstream catchment contributing to flow within Pinnacles Place, as it moves past the Site, is in the order of 4.8 hectares. The approximate extents of this catchment are shown in **Figure 14-1**.

There is also a small catchment area, in the order of 4.9 hectares, on the downstream side of Pinnacles Place, which contributes to flow moving in a southerly direction along the eastern side of the unsealed access road, as it passes through the Site. None of the flows generated by this catchment are directed through the Site, with the exception of runoff generated by the Site itself. Both of the neighbouring properties (north and south of the Site) also fall in a westerly direction towards the ephemeral drainage line, without directing runoff onto the Site.

The only way for upstream flows (i.e. flows generated by external areas) to encroach on the Site is if flows from the upstream catchment were to exceed the capacity of the road reserve in Pinnacles Place and spill into the Site. However, if flows generated by the upstream catchment were large enough to exceed the capacity of the road reserve, it is likely that most of these spilled flows would overtop the kerb and property boundaries at the north-western corner of Pinnacles Place, as opposed to the section of road passing in front of the Site, which would direct overflows through the northmost properties first. The possibilities of flows spilling out of the road reserve and into the Site is considered a low risk and is discussed in more detail in **Section 14.3.5**.

14.3.2 Receiving environment

Runoff from the Project Area contributes to flow within the ephemeral drainage line, Kelly's Creek and eventually Pine Creek. Information regarding the existing capacity, water quality and any sensitivities along these watercourses is limited.

Aerial imagery indicates the presence of some vegetation along the banks and invert of the creek line. It also appears as though it is an ephemeral drainage system for its entire length, up until Pine Creek discharges into Kudgee Lake (located around 80 kilometres south of the Project).

14.3.3 Stormwater management

The Site contains sparse vegetation with no formal drainage infrastructure in place. It is unlikely that any external flows drain through the Site, and any runoff generated by the Site itself would move as overland sheet flow towards Lot 7302 DP 1181129 and ephemeral drainage line.

Runoff generated by the rest of the Project Area drains directly to the ephemeral drainage line via existing overland flow paths.

14.3.4 Stormwater runoff quality

The Project Area does not include any formal water quality treatment measures before discharging to the ephemeral drainage line.

The sparse vegetation within the Site provides some slight protection against erosion; however, there are no formal erosion protection measures across the Site. Runoff generated by the Site is, therefore, likely to mobilise sediments and transport these sediments into the receiving environment.

The rest of the Project Area, along the transmission line which traverses Lot 7302 DP 1181129, has a denser and well-established sparse vegetative cover. This would provide greater protection against the erosive effects of rainfall and runoff.

14.3.5 Existing flood risk

DRAINS modelling was used to estimate the peak flow generated by the upstream catchment. The amount of runoff generated by the catchment was calculated using the loss parameters that were adopted for the *Broken Hill Urban Stormwater Master Plan* (Tonkin, 2006). The adopted values are summarised in **Table 14-2**.

Table 14-2 Adopted hydrological loss parameters

Parameter	Adopted value
Initial depression storage for impervious areas	1 mm
Initial depression storage for pervious areas	35 mm
Continuing loss for pervious areas	3 mm/hr

The model uses the latest rainfall depths and temporal patterns obtained from the Bureau of Meteorology (BoM). In accordance with the 2019 ARR recommendations, the model was run for an ensemble of storm events (varied temporal patterns for each storm duration) and the median peak flow for each storm duration was adopted.

It is estimated that the upstream catchment (4.8 hectares) (refer to **Figure 14-1**) would generate a peak flow in the order of 1.0 cubic metres per second in a 1% annual exceedance probability (AEP) storm event, and 0.6 cubic metres per second in a 5% AEP storm event.

Based on a review of aerial imagery and site photos, it is assumed that Pinnacles Place is approximately 13 metres wide with upright barrier kerbs (150 millimetres high) and a longitudinal grade of approximately 1.0%. On this basis, it is likely that flows would begin to overtop the kerb line in events larger than a 5% AEP storm event; however, the road reserve still has the ability to contain all of the 1% AEP flows without risking inundation of the adjacent properties. Therefore, it is extremely unlikely (or rare) that flows moving along Pinnacles Place would encroach on the Site.

It should be noted that storm events larger than a 1% AEP event, such as the probable maximum flood (PMF), have not been assessed as it is unlikely that such events would impact important infrastructure at the Project Area for the following reasons:

- Pinnacles Place, to the east of the Project Area still has some additional hydraulic capacity to convey flows larger than the 1% AEP flows
- If flows were to spill out of the road reserve, they would move through the two properties immediately north of the Project Area as these properties align directly with flows moving in a westerly direction along Pinnacles Place
- The Project is likely to incorporate an internal access road that would direct incoming flows around important infrastructure, located at the centre of the Site, and discharge to the Lot 7302 DP 1181129.

Runoff discharging from the Site would contribute to flow moving along the catch drain that runs along the eastern side of the unsealed road within Lot 7302 DP 1181129. It is expected that the Site would not be impacted by backwater effects caused by flow within this catch drain as flow exceeding the capacity of this drain would overtop the unsealed road and head towards the ephemeral drainage line before it moves back into the Site.

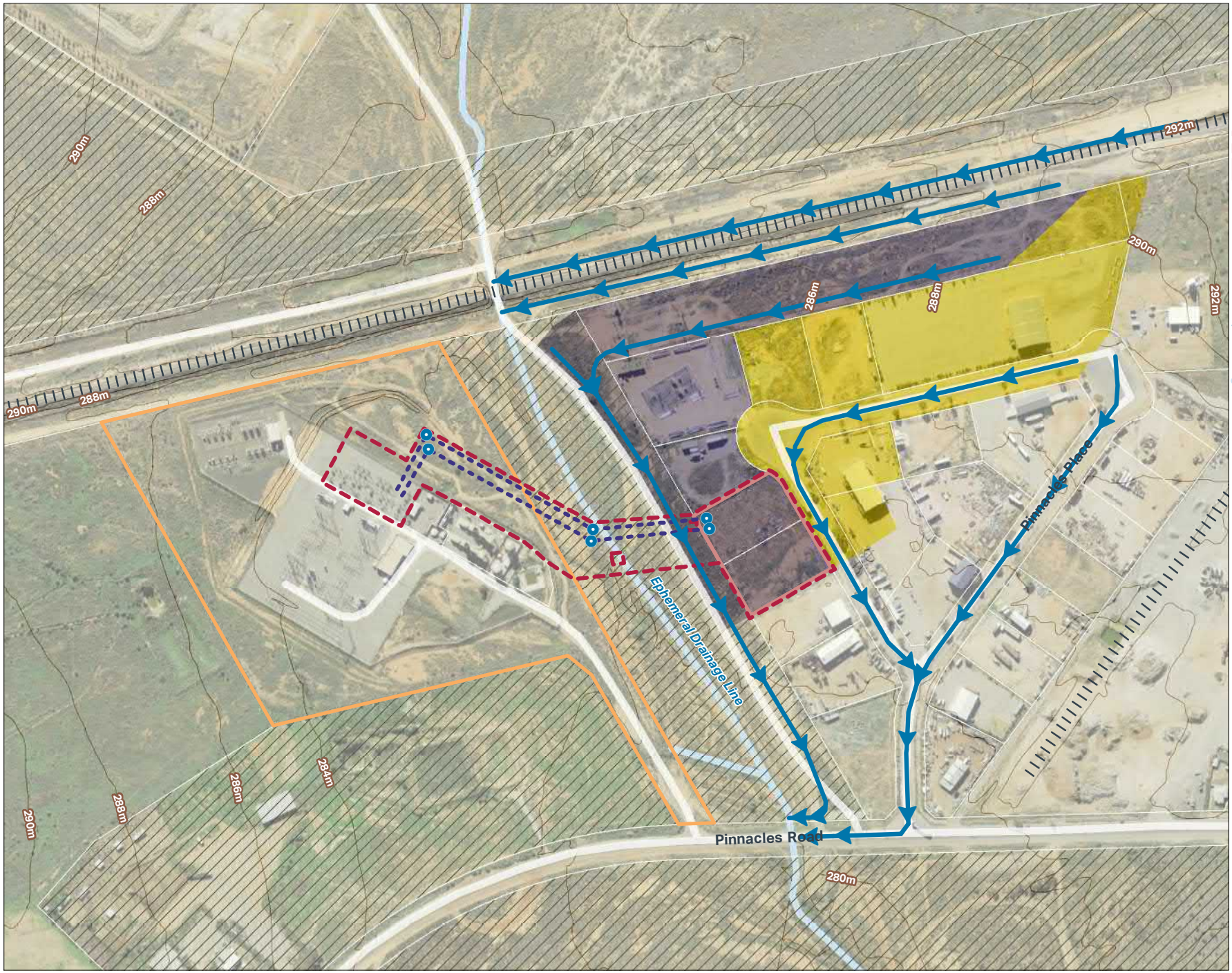
The remaining portion of the Project Area consists of the transmission line corridor which traverses the ephemeral drainage line. While the drainage line is dry for most of the year, it will be subject to flooding during storm events. Due to the pervious nature of the upstream catchment, it is likely that all flow generated by the catchment can be contained within the 120 metre wide Lot 7302 DP 1181129.

Based on the above findings, the Project Area is not likely to be impacted by flooding and quantitative flood modelling has, therefore, not been undertaken.

14.3.6 Water use and wastewater management

Given the Site is currently used for the storage of equipment, there is limited demand for potable water and wastewater services. There is an existing water main that runs along Pinnacles Place, with a single water hydrant located in front of the Site. There is also an existing sewer main that runs along the rear (western) boundary of the Site with connection points in both parcels of land (i.e. Lots 57 and 58 of DP 258288).

Currently, there are no requirements for water or wastewater services within the remaining portion of the Project Area, nor are there any existing water or wastewater mains servicing this land.



AECOM

N

0 50 100 m

Legend

- Project Area
- Site
- TransGrid Broken Hill substation
- Commons
- Catchment contributing to flow along Pinnacles Place
- Catchment contributing to flow along Crown Land access road
- Flow direction
- Railway
- Ephemeral watercourse
- Contour
- Indicative overhead transmission line
- Indicative transmission line pole

FIGURE 14-1:
EXISTING DRAINAGE AND CATCHMENTS

Source: © Department of Customer Service 2020

14.4 Impact assessment

14.4.1 Construction

Surface water drainage

Construction works have the potential to impact overland flow paths moving through the Site and the wider Project Area, resulting in the minor redistribution of some surface flows. The disruption of existing flow paths is likely to occur as a result of earthworks, and the potential impacts could include:

- Localised ponding occurring at new areas across the Project Area and impacting works
- Earthworks causing runoff to move as concentrated flows, as opposed to existing runoff moving as sheet flow, which has the potential to scour out the earth and mobilise sediment
- Earthworks directing concentrated flows into the neighbouring properties which could potentially create drainage/flooding issues within these properties.

As the Site is developed, it would increase the impervious area and increase runoff, resulting in the potential to overload the existing drainage systems, such as the catch drain along the eastern side of the unsealed access road in Lot 7302 DP 1181129. If stormwater runoff is not managed appropriately this increased runoff could also be directed into adjacent properties.

Given the small size of the Project Area in the context of the wider catchment draining to the ephemeral drainage line, the redistribution and possible increase of flows during construction is not expected to significantly affect the performance of downstream drainage infrastructure. Management and mitigation measures are included in **Section 14.5** to ensure the risk of the redistribution of flows is minimised.

Flooding

As per the existing flood risk assessment in **Section 14.3.5**, the Site is not likely to be impacted by flooding events up to and including a 1% AEP storm event. As it is unlikely that floodwaters will move through the Site, the construction works within the Site are not likely to impact on the flood behaviour.

Construction works within the wider Project Area (i.e. within the Lot 7302 DP 1181129) have the potential to interact with flood waters. While the drainage line is generally dry most of the year, there is potential for the upstream catchment to generate large flows during a high intensity rainfall event which would be directed to the ephemeral drainage line and could result in flooding along the drainage line.

Flooding along the ephemeral drainage line during construction works would present a safety hazard to construction personnel, cause damage or loss of materials and equipment and could potentially lead to materials being washed off-site which could potentially block drainage infrastructure.

Given the short-term duration for the construction works along the transmission line corridor, it is extremely unlikely that a flood event along the ephemeral drainage line would coincide with construction works (refer to **Section 4.3.3**).

Flooding impacts would be avoided and minimised through the implementation of management and mitigation measures identified in **Section 14.5**.

Water quality

The potential impacts to water quality as a result of the construction of the Project include:

- Earthworks could increase the amount of sediment and nutrients being mobilised and transported downstream via stormwater runoff
- Earthworks resulting in concentrated flows, as opposed to sheet flow, that have more potential to scour the earth and increase sediment loads carried by surface waters
- Contamination of surface waters due to accidental spillages of fuel, lubricants, effluent and other chemicals and materials used during construction

- Loosening of soils due to vehicle movements which could transport sediment into the waterways either by runoff carrying sediment or through sediments attached to the vehicles traversing the ephemeral drainage line
- Dewatering open excavations following periods of rainfall, which may contain sediments and other pollutants mobilised by the rainfall.

Where sediments are mobilised from construction areas and allowed to enter the receiving waterways, there is potential for adverse impacts to water quality by increased turbidity, lowered dissolved oxygen levels and increased nutrients and pollutants.

Through the implementation of the standard management and mitigation measures outlined in **Section 14.5**, potential water quality impacts to receiving watercourses are likely to be negligible.

Water use and wastewater

Water would be required during the construction phase for a range of uses including:

- Dust suppression
- Pressure wash construction trucks
- Workforce amenities.

Based on 100 litres of water supply per person per day, and a maximum of 50 construction workers at any one time, four kilolitres per day of water consumption would be expected. This would increase the demand for potable water, increase amount of wastewater requiring disposal, and alter the existing water supply arrangements across the Project Area

Occasionally water would be required for dust suppression; however, the volume is expected to be insignificant based on the limited earthworks required (refer to **Chapter 17.0 Other matters – Air quality**).

The water is likely to be sourced from the existing potable water on-site. If it cannot, an alternate means for water supply would be arranged.

14.4.2 Operation

Surface water drainage

Under existing conditions the Site is almost entirely pervious. The proposed layout of the Site would increase the impervious area which would in turn increase the runoff generated by the Site. Areas contributing to an increase in impervious area include:

- Concrete pads for supporting the inverters, transformers and batteries
- Access/internal roads around the perimeter of the Site
- Office buildings
- Car park.

The Stormwater Management Design (**Appendix G Surface water assessment**) indicated that the impervious area would likely increase from 0% to 40%, which would increase the discharge from the Site from 150 litres per second to 345 litres per second in a 1% AEP storm event. This increase in runoff has the potential to marginally alter the performance of drainage systems immediately downstream of the Site, such as the catch drain along the eastern side of the unsealed road in the Commons and the downstream culvert crossings. The small increase in runoff, in comparison to the peak flows generated by the wider catchment draining to the ephemeral drainage, would have minor impact on the performance of the broader downstream drainage system.

The Stormwater Management Design (**Appendix G Surface water assessment**) indicated that a volume in the order of 240 cubic metres would be required to be managed/detained on-site. The requirement for, and a location of a management detention system would be identified during detailed design.

The small increase in runoff and changes to the overland flow patterns would also be managed by the proposed site drainage system. This would include table drains and culverts that direct flow around the perimeter of the Site and along the internal road network. These table drains and culverts would convey flow towards to the south west corner of the Site, before discharging to Lot 7302 DP 1181129.

The remaining portion of the Project Area (i.e. along the transmission line corridor) would not impact on surface water drainage, as the transmission lines are likely to be set above ground and transmission line poles would have a negligible impact on surface water drainage within the area.

Flooding

As discussed in **Section 14.4.1** for the construction phase of the Project, the Site would not be affected by flooding under both pre- and post-development conditions. Therefore, the Project would not impact existing flooding regimes or adversely impact flooding at downstream or neighbouring properties. Under existing conditions, the neighbouring sites did not direct surface water onto the Site. Therefore, raising levels within the Site would not impact on flooding and drainage at these properties.

Due to the scale of the Site (0.8 hectares) relative to the size of the upstream catchment (2.7 square kilometres), incorporating a detention basin on-site, if required, would not alter the downstream flooding regime.

There is a possibility that large storm events, such as the PMF, could spill onto the Site. Office buildings, inverters, transformers and batteries would be elevated above the existing surface level on concrete pads and would be protected from potential floodwaters that encroach on the Site. The surrounding road network would also direct any floodwaters around the central battery storage area.

Along the transmission line, there may be poles that encounter floodwaters moving along the ephemeral drainage line. Due to the small width of these poles, relative to the full width of the ephemeral drainage line, it is expected that they would only create a slight obstruction to flows moving in a southerly direction as floodwaters would easily be directed around the poles. The transmission line would, therefore, have a negligible impact on the behaviour of floodwaters within the area.

Any transmission poles located within the ephemeral drainage line may be impacted by floodwaters in large storm events. To structurally support the poles, and withstand the impacts of potential floodwaters, these poles would be drilled to approximately three metres below ground level. The requirement to further protect the poles from floodwaters would be assessed during detailed design, pending their final location.

Water quality

The introduction of impermeable surfaces across the Site would reduce the potential for sediment and nutrient mobilisation. The proposed operations at the Site could, however, introduce a number of additional pollutants and other opportunities for sediment mobilisation. Key sources of pollutant generation at the Site could include:

- Vehicle by-products, such as oils and grease, as they traffic the Site or park on-site
- General litter introduced through workers
- Hazardous substances from a battery spill/leak
- New site layout concentrating flows which would increase the risk of scour and sediment mobilisation
- Raindrop and rill erosion on the pervious surfaces surrounding the batteries pervious surfaces due to the surface not having a protective cover or having insufficient compaction.

MUSIC modelling was undertaken as part of the Stormwater Management Design (**Appendix G Surface water assessment**) to stimulate pollutant production and water quality treatment throughout the Project Area. This showed that if water-sensitive urban design (WSUD) features, such as vegetated table drains, are installed to treat stormwater runoff generated by the Site, water quality targets outlined in the Australian and New Zealand guidelines for fresh and marine water quality (ANZG) guidelines would be met. These measures would also reduce the number of pollutants that have the potential to be generated by the Project, such as general litter, vehicle by-products,

sediments and nutrients. As such, water quality impacts to the ephemeral watercourse within Lot 7302 DP 1181129 would be negligible, taking into account the management and mitigation measures described in **Section 14.5**.

There are no ongoing operations within the remainder of the Project Area, along the transmission line, other than maintenance works. Maintenance works along the transmission line would be undertaken in a manner that minimises the disturbance to local vegetation and soils and would not impact on the water quality of the ephemeral watercourse.

Water use and wastewater

During daily operations, there may be up to three personnel on-site at any given time.

Since the Site was previously undeveloped and had limited demand for water use and wastewater, the minor and intermittent increase in on-site personnel would likely increase these demands. Connection to the existing water main within Pinnacles Place and the existing sewer main at the western end of the Site would need to be established in order to service these demands. However, this increase in water and wastewater demand would be minimal, would be in keeping with the expected demand when the land was subdivided as an industrial estate and would not have an impact on the performance of the existing water and sewer mains.

There would be no additional operational demand for potable water and wastewater services across the remainder of the Project Area.

14.5 Management and mitigation measures

The implementation of management measures would reduce the potential surface water, flooding and water use impacts of the Project to the greatest extent practicable. A list of relevant surface water, flooding and water use impacts and the associated mitigation measures that would be implemented to address the impact are listed below in **Table 14-3**.

Mitigation measures in other chapters that are relevant to the management of surface water, flooding and water use include:

- **Chapter 11.0 Soils, groundwater and contamination,** specifically measures which address erosion and sediment control for the Site during construction and operation
- **Chapter 16.0 Hazards and risk,** specifically measures which address potential spills during construction and operation
- **Chapter 17.0 Other matters,** specifically measures which address waste management during construction and operation.

Table 14-3 Management and mitigation measures – Surface water, flooding and water use

Ref	Mitigation and management measures	Timing
SW1	A Soil and Water Management Plan (SWMP) would be included as part of the CEMP. This SWMP would be prepared in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1* (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 of soils and sediment production across the Project Area.	Construction

Ref	Mitigation and management measures	Timing
	• details of potable water requirements during construction • Measures to cease works within Lot 7302 DP1181129 and secure equipment when a severe weather warning is issued for the immediate area	
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. • 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.	Operation
SW3	Site buildings would incorporate a roof drainage system, designed in accordance with Australian Standards, that safely discharges roof runoff to the Site's surface water drainage system and rainwater tanks to prevent roof runoff from eroding soils.	Operation
SW4	The battery design would incorporate spill containment measures to prevent battery spillage from entering the Site drainage system or downstream waterways.	Operation
SW5	The requirement for additional measures to protect the transmission line poles from floodwaters within the Lot 7302 DP1181129 would be determined during detailed design.	Operation
SW6	Maintenance works along the transmission line 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

15.0 Bushfire

15.1 Secretary's Environmental Assessment Requirements

Table 15-1 sets out the SEARs relevant to bushfire risk and where the requirements have been addressed in this EIS.

Table 15-1 SEARs - Hazard and Risks - Bushfire

Relevant SEARs	
Hazards and Risk - Bushfire	**Where addressed**
The EIS must include: An assessment of potential hazards and risks including but not limited to bushfires, land contamination, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*	Bushfire risk associated with the Project is assessed in this chapter. An overview of potential impacts is provided in **Section 15.4** An assessment of potential hazards and risk is provided in in **Chapter 14.0 Hazard and Risk**. Potential contamination risk is assessed in **Chapter 11.0 Soils, groundwater and contamination**. An assessment of potential hazards and risks from electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* is provided in **Section 16.4.2**.

15.2 Methodology

A Bushfire Threat Assessment has been completed for the Project to assess potential bushfire impacts. The complete report is attached in **Appendix H Bushfire Assessment Report** with relevant aspects summarised within this chapter.

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 bushfire assessment involved:

- Reviewing the existing environment within and surrounding the Project Area. This was completed through a desktop study, including review of:
  - Aerial imagery
  - Vegetation mapping
  - Contours
  - NSW Rural Fire Service (RFS) bushfire prone land mapping
  - West Darling Bush Fire Risk Management Plan (West Darling Bush Fire Management Committee 2011)
- Assessing the hazards and risk regarding susceptibility of the Project to the impacts of bushfire

- Assessing the hazards and risk of fire initiating at the Project Area and spreading to impact adjoining developments
- Recommending bushfire protection measures to address the hazards and risk in accordance with PBP.

The risk assessment process and application of PBP to the assessment is detailed in **Section 15.2.1** and **Section 15.2.2** respectively.

15.2.1 Risk assessment

A risk assessment methodology has been used to assess the risk of:

- Impact of bushfire risk on the Project
- Impact of the Project on bushfire risk.

BFCC (2008) defines bushfire risk as the chance of a bushfire igniting, spreading and causing damage to assets of value. The NSW bushfire risk management planning process used in the assessment uses a risk classification scheme through qualitative scales to assess the likelihood and consequence of fire impact. This involved:

- Identifying the likelihood of a bushfire occurring through a review of the existing environment. The process for determining likelihood is outlined in **Table 15-2**
- Identifying the potential consequence of a bushfire event occurring. This includes consideration of threat, vulnerability and other issues such as level of impact and recovery costs. A description of each consequence rating is provided in **Table 15-3**
- Determining the bushfire risk level by combining the likelihood and consequence ratings, in accordance with the matrix provided in **Table 15-4**.

Table 15-2 Likelihood ratings for assessing bushfire risk (NSW Rural Fire Service, 2008)

Frequency	Fires are expected to spread and reach assets	Fires are not expected to spread and reach assets
Fires occur frequently	Almost certain	Possible
Fires occur infrequently	Likely	Unlikely

Table 15-3 Consequence ratings for assessing bushfire risk, (NSW Rural Fire Service 2008)

Consequence	Description
Minor	• No fatalities • Some minor injuries with first aid treatment possibly required • No persons are displaced • Little or no personal support (physical, mental, emotional) required • Inconsequential or no damage to an asset • Little or no disruption to community and little to no financial loss
Moderate	• Medical treatment required but no fatalities, some hospitalisation • Localised displacement of persons who return within 24 hours • Personal support satisfied through local arrangements • Localised damage to assets that is rectified by routine arrangements • Community functioning as normal with some inconvenience • Local economy impacted with additional financial support required to recover • Small impact on environment/cultural asset with no long-term effects
Major	• Possible fatalities • Extensive injuries, significant hospitalisation • Large number of persons displaced (more than 24 hours duration) • Significant damage to assets that requires external resources • Community only partially functioning, some services unavailable

Consequence	Description
	• Local or regional economy impacted for a significant period of time with significant financial assistance required • Significant damage to the environment/cultural asset which requires major rehabilitation or recovery works • Localised extinction of native species
Catastrophic	• Significant fatalities • Large number of severe injuries • Extended and large number requiring hospitalisation • General and widespread displacement of persons for extended duration • Extensive resources required for personal support • Extensive damage to assets • Community unable to function without significant support • Regional or state economy impacted for an extended period of time • Permanent damage to the environment • Extinction of a native species in nature

Table 15-4 Matrix to determine level of bushfire risk (NSW Rural Fire Service 2008)

Likelihood	Consequence			
	Minor	Moderate	Major	Catastrophic
Almost certain	High	Very High	Extreme	Extreme
Likely	Medium	High	Very High	Extreme
Possible	Low	Medium	High	Very High
Unlikely	Low	Low	Medium	High

15.2.2 Planning for Bush Fire Protection 2019 (PBP)

Planning for Bush Fire Protection 2019 (PBP) (NSW Rural Fire Service, 2019) establishes the regulatory framework for development within bushfire prone land and relevant bushfire protection measures. Development proposals on land identified as bushfire prone require assessment in accordance with PBP. The Project Area is identified as 'bushfire prone land' as indicated in **Section 15.3.1**.

PBP requires an assessment of hazard and specifies bushfire protection measures for the type of hazard and proposed class of development.

There are many different types of measures ranging from the wholesale clearing of vegetation to reviewing an insurance policy, and all can be grouped into the six broad categories listed below:

- Asset Protection Zones (APZ)
- Building construction and design (related to Bushfire Attack Level (BAL))
- Access arrangements
- Water supply and installation of utilities
- Landscaping and vegetation management
- Emergency management arrangements.

An APZ is a buffer area between a bushfire hazard and an asset which minimises the impact of fire on that asset. This involves the removal and continual management of vegetation to create a buffer zone that reduces the effect of flame contact and radiant heat on the asset as well as providing access for fire-fighting operations and other controls on the built environment. An APZ also reduces the chances of fire escaping from a site and entering surrounding bushland by ensuring a fuel-free environment whereby fire cannot propagate and spread.

Each measure or group of measures is considered important to address particular components of risk; however, in order to address the overall bushfire risk on a site, all six bushfire protection measures must be addressed. The bushfire protection measures and risk assessment have informed the development of mitigation measures for the Project (refer to **Section 15.5**).

15.3 Existing environment

This section provides an overview of the bushfire prone land mapped within the Project Area and surrounding area. This section also describes the existing environment in relation to parameters which may potentially impact on, or be impacted by bushfire, including terrain, vegetation, and fire weather and history. These parameters have been used to inform the likely bushfire behaviour and threat.

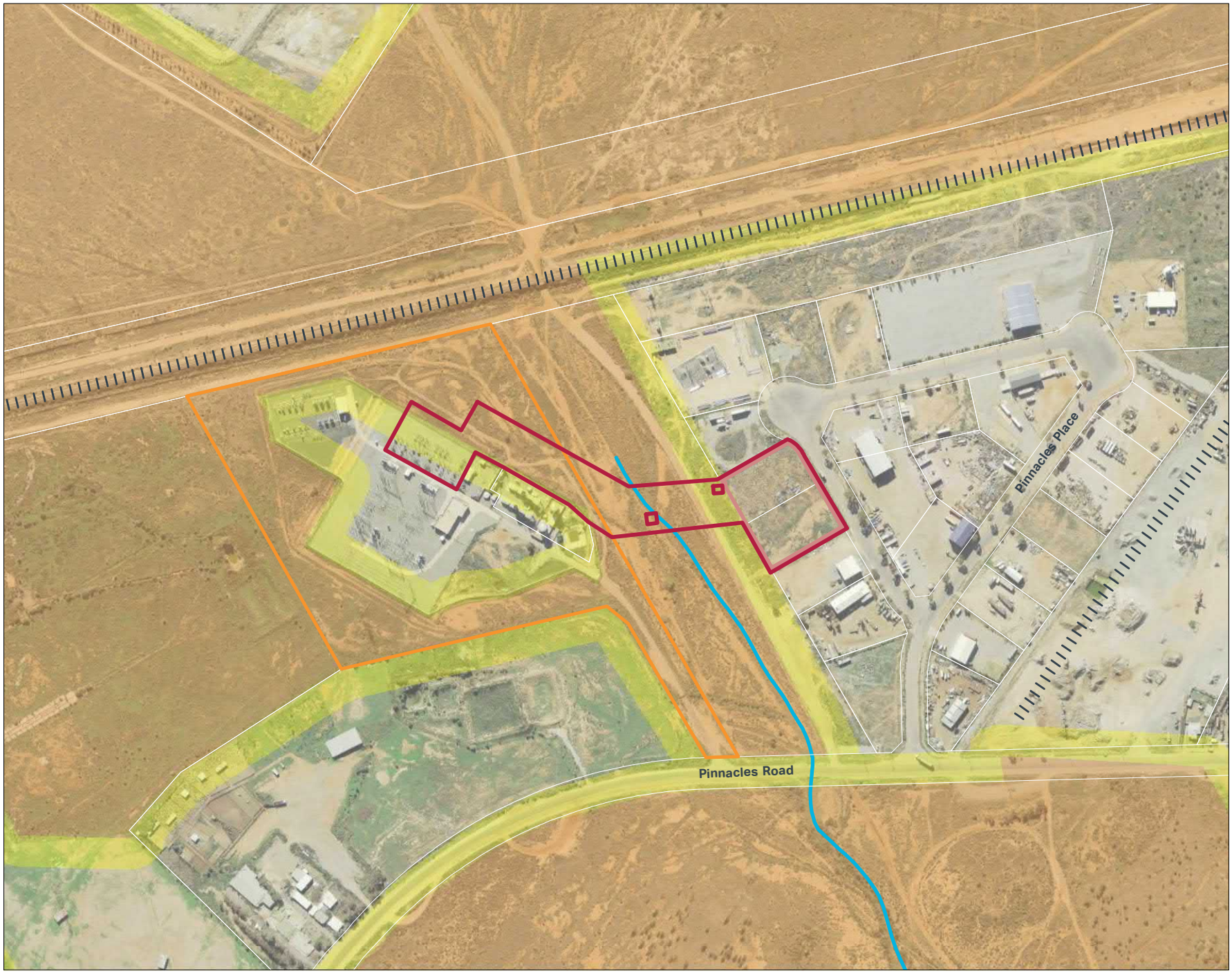
15.3.1 Bushfire prone land

Figure 15-1 shows the bushfire prone land mapping within and surrounding the Project Area. Land to the immediate west of the Site is located within the vegetation buffer for Category 3 land. The western extent of the Project Area is also located within the vegetation buffer for Category 3 land. The majority of the transmission line corridor is mapped as 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, 2015). The Category 3 land and the associated vegetation buffer are shown on **Figure 15-1**.

15.3.2 Terrain

Slope and terrain are important factors in determining the direction and rate of bushfire spread, as steeper slopes can significantly increase the rate of spread of fires. **Figure 15-2** shows the pattern of the terrain within and surrounding the Project Area. The Project Area is relatively flat, consisting of an arid gibber plain. The land slopes gently to the west into an ephemeral watercourse within the transmission line corridor. The gradient is less than 1.5 degrees and therefore falls within the PBP slope class of ‘downslope 0-5 degrees’.



AECOM

N

0 50 100 m

Legend

- Project Area
- Site
- TransGrid Broken Hill Substation
- Railway
- Watercourse

Bushfire Prone Land

- Vegetation Category 3
- Vegetation buffer

FIGURE 15-1:
BUSHFIRE PRONE LAND

Source: © Department of Customer Service 2020

FIGURE 15-2:
TERRAIN

Source: © Department of Customer Service 2020

15.3.3 Vegetation and fuel

Bushfire fuel is the vegetative material in the landscape that burns during a bushfire. Bushfire behaviour is influenced by fuel load, and the availability of the fuel which is mostly determined by the arrangement of the fuel and its moisture content. Fuel load and availability affects the intensity of a bushfire.

One vegetation community – the 'Gibber Chenopod shrublands' is present within the northern portion of the Site, in the transmission line corridor and adjacent to parts of the Project Area. The community also extends throughout surrounding lands beyond the Project Area where they have not been cleared or developed. The shrubland is considered to present a very low hazard due to the low fuel load (almost half the fuel load applied to grassland hazards) owing to the separated and clumpy nature of the plants.

Further detail on the vegetation within and surrounding the Project Area is provided in **Chapter 8.0 Biodiversity**.

15.3.4 Fire weather and history

The fire season within the West Darling rural fire district, in which the Project Area is located, usually runs from October to March. During this period, problematic fire weather is more common, being the combination of very hot days (i.e. 40 degrees Celsius and above) with low humidity (i.e. less than 10%) and strong westerly and north-westerly winds (WDBFMC, 2011).

Large scale fires are generally not common in the district. Ignition usually occurs from lightning strikes during summer storms. Although drought periods produce problematic fire weather, the fuel is usually not available to create a fire front that would significantly threaten assets (WDBFMC, 2011).

15.4 Impact assessment

15.4.1 Overview of bushfire risk

In assessing the bushfire risk of the Project, both the potential risk to the Project Area and the potential risk of fire spreading to external assets from the Project Area has been considered. This assessment is presented in **Table 15-5**.

Table 15-5 Assessment of level of bushfire risk

Fire scenario	Impact	Level of risk
Impact to the Project Area	• Likelihood – unlikely • Consequence – minor	Low
Impact to external assets	• Likelihood – unlikely • Consequence – minor	Low

Both risk scenarios are anticipated to result in a 'low' risk of bushfire impact. This can be attributed to the following factors:

- There is no significant history of landscape-wide fire within the Project Area or surrounding area, therefore the likelihood of a fire occurring would be considered unlikely
- The fuel and slope parameters of the Site and surrounding area (refer to **Section 15.3.3** and **Section 15.3.2** respectively) would not result in high intensity fires or high residence time
- The Project would be non-habitable development
- There would be adequate opportunities for fire control along the local road and trail network
- In the event of a potential fire, the response time by fire authorities is expected to be adequate due to the presence of a nearby fire brigade station 5.5 kilometres to the east
- The likelihood of the Project resulting in a fire is considered low (refer to **Appendix I Preliminary Hazard Analysis**).

As a comparison, the West Darling Bush Fire Risk Management Plan (WDBFMC, 2011) rated the residential interface of Broken Hill as low risk with the same likelihood and consequence ratings as allocated in this risk assessment.

In addition to these factors, Pinnacles Place, which provides access to the Site, is compliant with the PBP requirements for the design of public roads in bushfire prone areas. Existing site access routes are situated in a built-up environment on the edge of the City of Broken Hill where evacuation away from bushfire prone areas would be achieved almost immediately.

There is a hydrant located immediately in front of the Site on Pinnacles Place beside the existing gate, approximately in the centre of the eastern boundary. The distance from the hydrant to the rear (western) boundary of the Site is approximately 80 metres and therefore, would be adequate for the supply of water for the suppression of bushfires at the Site, should one occur.

15.4.2 Construction

As detailed in **Section 15.4.1**, there would be an overall low risk of bushfire impact to the Project Area.

Based on the terrain, vegetation and fuel, and fire weather and history of the Project Area and surrounds (refer to **Section 15.3**), the potential for a bushfire to spread and impact the Project Area during construction would arise from a combination of problematic fire weather (i.e. hot and dry westerly winds during summer), compounded by ignition from within the Project Area or external to the Project Area (e.g. lightning strike).

Similarly, the potential for a bushfire to spread and impact external assets in the adjacent industrial area would arise from a combination of problematic fire weather, compounded by ignition from within the Project Area or external to the Project Area. The implementation of bushfire protection measures detailed in **Section 15.5** would manage this risk.

During construction of the Project, 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 (for example, cardboard, paper packing material and mulched/chipped vegetation), 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 Project 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. The risk of accidental leaks or spills during construction would be adequately managed through the measures detailed in **Chapter 11.0 Soils, groundwater and contamination**.

15.4.3 Operation

As detailed in **Section 15.4.1**, there would be an overall low risk of bushfire impact to the Project Area.

Similar to the construction phase of the Project, the potential for a bushfire to spread and impact the Project Area during operation would arise from a combination of problematic fire weather (i.e. hot and dry westerly winds during summer), compounded by ignition from within the Project Area or external to the Project Area (e.g. lightning strike). The implementation of an APZ and other bushfire protection measures detailed in **Section 15.5** would manage this risk.

During operation, equipment used for maintenance activities may have the potential to create a fire risk through the generation of sparks or heat. However, this equipment would present a low fire risk and would not be regularly used in the Project Area. Potential accidental spills of fuel, oil and flammable liquid may also increase the risk of bushfire during operation, particularly in proximity to dry combustible materials. The Project would be designed to avoid the risk of accidental leaks or spills occurring, as set out in the measures in **Chapter 14.0 Surface water, flooding and water use**.

Asset Protection Zone

Assets within the Site (i.e. battery storage units, inverters and transformers) would be relatively more vulnerable to bushfire risk, compared to other components (the risk of combustion is discussed in **Appendix I Preliminary Hazard Analysis**). As such, all assets at the Site would be afforded an APZ to prevent exposure to a radiant heat flux greater than 12.5 kilowatts per square metre. To achieve this, an APZ of 10.5 metres measured from the western boundary of the Site would be provided.

The following parts of the Project Area are not considered to require an APZ for the following reasons:

- The northern, eastern and southern sides of the Site due to the presence of managed lands
- The 22 kV busbar at the Broken Hill TransGrid substation due to an existing APZ
- The transmission line, as the vegetation clearance requirements of ISSC 3 Guideline for Managing Vegetation Near Power Lines (Industry Safety Steering Committee, 2005) would be implemented to manage any potential bushfire risk.

15.5 Management and mitigation measures

The risk of bushfire impact to the Project Area and fire initiating and spreading from the Project 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 ensure a 'measures in combination' approach as required by Planning for Bush Fire Protection 2019. The proposed measures are presented in **Table 12-14** as management and mitigation measures for the Project.

Management and mitigation measures in other chapters that are relevant to the management of bushfire risk include:

- **Chapter 11.0 Soils, groundwater and contamination**, specifically measures which address management of potential spills and leaks during construction and operation
- **Chapter 14.0 Surface water, flooding and water use**, specifically measures which address spill avoidance and containment during operation
- **Chapter 16.0 Hazards and risk**, specifically measures which relate to the management of an APZ and potential spills during construction and operation.

Table 15-6 Management and mitigation measures - Bushfire

ID	Management and mitigation measure	Timing
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 *Planning for Bushfire Protection 2019* design and construction standards for property access roads (Table 5.3b)	Construction and operation
BF3	The vegetation clearance distance to any overhead transmission lines within the Project Area would comply with the document ISSC 3 Guideline for Managing Vegetation Near Power Lines (Industry Safety Steering Committee 2005)	Operation
BF4	A 'Bushfire Emergency Management and Evacuation Plan' would be prepared in accordance with the RFS document 'A Guide to Developing a Bushfire Emergency Management and Evacuation Plan' (RFS 2014) for the construction and operation phases of the Project	Construction and operation

ID	Management and mitigation measure	Timing
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

16.0 Hazards and risk

16.1 Secretary's Environmental Assessment Requirements

Table 16-1 sets out the SEARs relevant to hazards and risk and where the requirements have been addressed in this EIS.

Table 16-1 SEARs - Hazards and risk

Relevant SEARs	
Hazard and Risks	**Where addressed**
This EIS must include: A Preliminary Hazard Analysis (PHA) must be prepared in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development, the Department's Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-level Risk Assessment*	A PHA has been prepared in accordance with State Environmental Planning Policy No 33—Hazardous and Offensive Development (SEPP 33) and Hazardous Industry Planning Advisory Paper No. 6 (HIPAP No 6). The PHA has been provided as **Appendix I Preliminary Hazard Analysis** and summarised in **Section 16.4**. The objective and subsequent methodology of the PHA is detailed in **Section 16.3**.
An assessment of potential hazards and risks including but not limited to bushfires, land contamination, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*	The PHA has captured an assessment of potential hazards and risk associated with the Project, including but not limited to: • Bushfires and spontaneous ignition • Loss of containment • Exposure to electromagnetic fields.

16.2 Existing environment

The Project Area is located within an existing industrial area, west of the Broken Hill city centre. As set out in **Section 2.3**, the Site is currently used as a storage area for equipment, vehicles and other materials. Vegetation in the Project Area is in a degraded state with broad areas of bare sand present and as such, there is very limited fauna habitat (refer to **Chapter 8.0 Biodiversity** for further detail).

It is likely that some overland flows from the Site may drain to the ephemeral drainage line, which heads south and eventually joins into Kelly's Creek. The transmission line corridor within the Project Area also drains to the ephemeral drainage line. The central channel of Kelly's Creek is located approximately 5.5 kilometres south of the Project Area. The channel drains in a southerly direction. It is likely that groundwater also drains in a southerly or south-easterly direction. Kelly's Creek eventually drains into Pine Creek approximately 11 kilometres south of the Project Area.

Chapter 15.0 Bushfire details the bushfire risk of the Project Area (medium risk). The adjacent shrubland is considered to present a very low hazard due to the low fuel load (almost half the fuel load applied to grassland hazards) owing to the separated and clumpy nature of the plants.

The probability of occurrence of ASS across the Project Area is low (refer to **Chapter 11.0 Soils, groundwater and contamination** for further detail). Reference to the Geoscience earthquake risk map (Geoscience Australia, 2019) indicates a low to moderate earthquake risk at the Project Area in Broken Hill. The land subsidence risk would be low, as geotechnical investigations undertaken for the Project to eight metres below ground level did not encounter groundwater (refer to **Chapter 11.0 Soils, groundwater and contamination** for further detail).

16.3 Methodology

16.3.1 Preliminary Risk Screening

SEPP 33 outlines the approach used in NSW for planning and assessing the hazards and risk associated with industrial development projects. Through the Policy, the permissibility of a project is linked to its safety and pollution control performance. SEPP 33 applies to any projects that fall under the Policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'; or as requested by DPIE. A potentially hazardous industry under SEPP 33 is defined as development for the purposes of any industry where, if the development were to operate without employing any measures to reduce or minimise its impact the development would pose a significant risk to human health, life or property or to the biophysical environment.

Clause 12 of SEPP 33 requires developments that are classified as potentially hazardous under SEPP33 to prepare a preliminary hazard analysis (PHA) to determine the risk to people, property and the biophysical environment at the proposed location and in the presence of controls.

DPIE's Hazardous and Offensive Development Application Guidelines (Applying SEPP 33) serves as a guide for the steps to be taken in determining whether a proposal is potentially hazardous or offensive. It provides a list of threshold levels for the storage and transport of dangerous goods. Where the amount of material to be stored or transported exceeds that threshold, SEPP 33 is considered to apply to the Project, potentially requiring a PHA.

16.3.2 Preliminary Hazard Analysis

A Preliminary Hazard Analysis (PHA) has been prepared to assess potential hazards and risk associated with the Project. The complete report is attached in **Appendix I Preliminary Hazard Analysis** with relevant sections summarised within this chapter. The PHA has been prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis* (HIPAP 6), being a requirement of the SEARs.

The objective of the PHA is to assess potential hazards and risk associated with the Project, including:

- Hazardous materials or reactions, including spontaneous ignition from a runaway reaction at the BESS facility
- Land contamination from spills of pollutant material
- Initiation of hazardous events from bushfires in the area or initiation of a bushfire due to a fire event from the Project
- Electromagnetic fields (EMF) of the proposed grid connection against the International Commission of Non-Ionising Radiation Protection (ICNIRP) guidelines.

The hazard analysis process encompasses qualitative methods to assess the adequacy of the Project controls. The aim of the PHA is to determine if the Project can be developed with the associated hazards kept 'as low as reasonably practicable' (ALARP), and to ensure appropriate land use safety planning. The PHA follows a series of sequential steps (as detailed within HIPAP 6) in the assessment of potential hazards associated with the Project, which can be generally described as:

1. Identification of hazards:
    - Identify all potential incidents and related hazards
    - Undertake hazard workshops and reporting to agree hazard scenarios for assessment.
2. Frequency assessment – an assessment of likelihood of each hazard scenario occurring:
    - Analyse a range of data applicable to the operation of the Project, including logistics data, historical failure rates
    - Calculate the probabilities for the chances of certain events occurring as a result of the Project

3. Consequence assessment – an assessment of the effect of each hazard scenario occurring:
    - Establish a range of models, which can be used to determine the consequence of various hazards and events, which may occur as a result of the operation of the Project.
4. Risk assessment resulting from the potential combination of frequency and consequence of creditable risk scenarios:
    - Classification of consequences and likelihoods of each hazardous event based on similar industry events and literature review.
5. Presentation of results in a standardised format:
    - Identify risk levels at identified receivers and land use locations in the vicinity of the Project.
6. Comparison with established risk criteria:
    - Compare the outcomes of the site-specific risk and consequence assessment for each of the developed scenarios against the relevant criteria for each studied receiver location
    - Establish compliance or otherwise against the established risk criteria.

A detailed description of the methodology applied in the PHA is provided in Section 1.5 of **Appendix I Preliminary Hazard Analysis**.

16.4 Impact assessment

16.4.1 Preliminary risk screening

For materials relevant to the Project, **Table 16-2** presents the class of hazardous material under the *Australian Code for the Transport of Dangerous Goods by Road & Rail*, the amount of material to be stored and the thresholds as prescribed by Hazardous and Offensive Development Application Guidelines (Applying SEPP 33) for that material.

Table 16-2 SEPP 33 storage screening summary

Class	Material	Quantity to be stored	SEPP 33 threshold (kg)	Does SEPP 33 apply?
Combustible liquid C1 (AS 1940)	Oil in the transformers	About 50,000 L (45-50 T)	Combustible liquid C1 is not classified as a potentially hazardous material under SEPP 33.	No
Class 9	Li-ion batteries	Each battery module weighs approximately 330 kg, with each enclosure weighing around 8.6 T. The exact weight of Li-ion is not known at this stage; however, this does not impact on the findings and outcome of the PHA.	Li-ion is not classified as a potentially hazardous material under SEPP 33.	No

For materials relevant to the Project that would need to be transported to Site, **Table 16-3** presents the class of hazardous material under the *Australian Code for the Transport of Dangerous Goods by Road & Rail*, the amount of material to be transported and the SEPP 33 threshold for that material.

Table 16-3 SEPP 33 transport screening summary

Class	Material	Vehicle movements		SEPP 33 threshold (vehicles)	Does SEPP 33 apply?
		Cumulative annual	Peak weekly		
Combustible liquid C1 (AS 1940)	Oil in the transformers	Much less than the threshold of 1,000 vehicles.	Much less than the threshold of 60 vehicles.	Annually: Greater than 1,000 vehicles Peak weekly: Greater than 60 vehicles	No
Class 9	Li-ion batteries	During construction: much less than the threshold of 1,000 vehicles. During operation: nil.	During construction: much less than the threshold of 60 vehicles. During operation: Nil.	Annually: Greater than 1,000 vehicles Peak weekly: Greater than 60 vehicles	No

Further to this, by adopting the precautionary principle, the PHA considered a preliminary screening assessment of 'other risk factors' that could result in impacts to adjacent land uses. The results from this assessment are summarised in **Table 16-4.**

Table 16-4 SEPP 33 screening assessment - other types of hazards

Other risk factors	Details	Requires further analysis
Any incompatible materials (hazardous and non-hazardous materials)	No incompatible materials have been identified for this Project.	No other hazard identified.
Any wastes that could be hazardous	No significant wastes were identified for the operation of this Project. Localised hydrocarbon impacts were identified in the southern portion of the Site (refer to **Chapter 11.0 Soils, groundwater and contamination**), which would be managed during the construction phase of the Project.	No other hazard identified.
Types of activities the dangerous goods and otherwise hazardous materials are associated with (storage, processing, reaction), if different to **Table 16-2** and **Table 16-3** above.	No significant hazardous activities associated with dangerous goods were identified for this Project.	No other hazard identified.
Incompatible, reactive or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition	Potential for thermal runaway reaction associated with Li-ion batteries.	This potential other hazard has been discussed in **Section 16.4**.

Other risk factors	Details	Requires further analysis
Storage or processing operations, involving high (or extremely low) temperatures and/ or pressures	No extreme conditions with high (or extremely low) temperatures and/or pressures were identified for this Project.	No other hazard identified.
Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries	Thermal runaway reaction associated with Li-ion batteries has occurred in other similar industries in the past.	This potential other hazard has been discussed in **Section 16.4**.
The Project may threaten the particular qualities of the environment (for example, the likely presence of rare or threatened species, watercourses)	No significant impact to threatened species or watercourses are likely to be affected as a result of the Project (refer to **Chapter 8.0 Biodiversity** and **Chapter 12.0 Surface water, flooding and water use**).	No other hazard identified.
The nature of the hazards that the environment will be exposed to, and the likely response of the environment to such a hazard, and the reversibility of any hazardous impact.	Information available for the Project is such that environmental pollution cannot be ruled out in case of a loss of containment.	This potential other hazard has been discussed in **Section 16.4**.

Based on the screening assessment provided in **Table 16-2** and **Table 16-3**, it is evident that the materials considered to be dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road & Rail* that would be stored and transported to the Site do not exceed the guideline thresholds.

In light of an assessment against the 'other risk factors' contained in **Table 16-4** it is evident that there are some risks which are relevant to the Project. On this basis, a PHA has been prepared for the Project and contained in **Appendix I Preliminary Hazard Analysis**.

16.4.2 Preliminary Hazard Analysis

Hazard identification

A hazard identification exercise was undertaken in accordance with the HIPAP 6 methodology (refer to **Section 16.3**) to identify all reasonably foreseeable hazards and associated events that may arise during the operation of the Project. The hazard events identified from the exercise included:

- Fire at the BESS e.g. from thermal runaway or electrical fault
- Loss of containment of a pollutant
- Fire and pollution at medium voltage and high voltage infrastructure
- Exposure to electromagnetic fields
- Other hazardous events including:
  - Natural hazards
  - Security breach that causes a hazardous incident
  - On-site traffic impact causes hazardous incident.

Risk evaluation

A risk evaluation was conducted as part of the PHA to consider whether the level of risk associated with the identified hazards generally meets acceptable risk criteria.

Where a hazard has the potential for off-site effects, the consequence levels in the risk matrix are applied to both on-site works and any people off-site who are within the range of the effect. Qualitative guidelines are given to ensure that off-site risk is eliminated or prevented and where that is not possible, controlled. In addition to meeting the qualitative criteria, risk minimisation and use of best practice must be demonstrated.

Classification of consequences and likelihoods of each of the identified hazardous events was captured as part of the PHA (refer to Section 5.2 and Appendix 3 under **Appendix I Preliminary Hazard Analysis**). The outcome of the risk assessment is summarised in **Table 16-5**. The risk criteria adopted for this Project is contained in Appendix 2 of **Appendix I Preliminary Hazard Analysis**. In summary, the consequence levels for the environment presented in **Table 16-5** can be defined as:

- Level 1: single minor event with negligible short-term environmental impact. No history of event
- Level 2: small scale and short-term environmental impact. Event has occurred previously
- Level 3: moderate short to medium term environmental impact
- Level 4: significant medium-term impact on important (listed or protected) environment/habitat
- Level 5: long term impact on important (listed or protected environment/ habitat).

Table 16-5 Risk profile for the Project

Hazardous incident/event	Consequence	Likelihood (with existing and recommended controls)	Risk
BESS			
Thermal runaway with fire and generation of toxic vapours	Level 4	Rare	Moderate
Loss of containment of pollutant/irritant materials from the BESS with potential exposure and pollution	Level 2	Rare	Low
Electrical fault inside BESS causing fire	Level 4	Rare	Moderate
Exposure to voltage at the battery leading to electrocution	Level 4	Rare	Moderate
MV and HV development, including 22kV transmission line			
Arc flash in MV cable reticulation network, substation, BESS or transformers	Level 4	Rare	Moderate
Exposure to voltage leading to electric shock	Level 4	Rare	Moderate
Fire or pollution at the transformers	Level 4	Rare	Moderate
Switch room fire	Level 4	Rare	Moderate
Project area			
Bushfire impacts of the Project or Project initiate fire	Level 4	Rare	Moderate
Exposure to electric and magnetic fields at the BESS, transmission line, MV reticulation, busbar at the substation, and transformers	Level 3	Rare	Low
Security breach causes major consequences	Level 4	Rare	Moderate

Hazardous incident/event	Consequence	Likelihood (with existing and recommended controls)	Risk
Natural hazards (earthwork, dust storm, lightning strike, wildlife interference) that causes major consequences	Level 4	Rare	Low to Moderate (earthquake only)
On-site vehicular traffic impact causes major consequences	Level 3	Rare	Moderate

The consequences of the *Moderate* risk events are defined as Level 4, implying significant medium-term human health, or environment impacts, depending on the nature of the hazard. The likelihoods of all events can be designed and managed to *Rare* likelihood once commitments to safety and recommendations (discussed in **Section 16.5**) are implemented.

The worst-case consequences identified for the Project are associated with a fire event in the BESS initiated through a thermal runaway or an electrical fault inside one of the battery enclosures (assessed below).

Further discussion regarding identified events is provided in the section below, including details regarding consequence, likelihood, and risk. A discussion around identified hazardous events is provided in Section 5.2 and Appendix 3 of **Appendix I Preliminary Hazard Analysis**.

Fire at the BESS

Fire at the BESS may be caused as an internal event (e.g. thermal runaway), or as an external event, such as bushfire. A fire event would generate heat, deflagration overpressure, toxic gas and combustion products. If the burning battery cells are located close to combustible materials within the enclosure or if the enclosure is located close to other infrastructure, there is a potential for escalation to adjacent infrastructure and potentially to the entire BESS. The result would be an increased generation of heat, toxic gases, and combustion products. If the BESS is located close to the surrounding environment, including neighbouring bushland, the fire may propagate, potentially initiating fire in the surrounding area (i.e. off-site impacts). As discussed in **Chapter 15.0 Bushfire**, the adjacent shrubland is considered to present a very low hazard due to the low fuel load. As such, the risk associated with fire propagation as a result of neighbouring bushland is considered low.

The battery enclosure design and the BESS layout must provide sufficient separation distances. In addition, a sufficient APZ must be established to ensure the risk of propagation to and from the surrounding environment is minimised.

In response to the potential impact of fire at the BESS, the following strategy should be adopted:

- Prevent, as far as reasonably practicable a thermal runaway event from occurring
- Minimise the consequence of a hazardous event through the installation of gas venting, fire barrier, deflagration panel/plate, and (if required) automatic fire quenching inside the battery enclosures
- Access into the enclosure during a hazardous event must be prevented
- Provision of sufficient separation between battery enclosures and other BESS infrastructure
- Provision of active firefighting measures within the BESS.

A review of the Project against recommended separation distances was undertaken as part of the PHA. A summary of the findings is provided below:

- The Site is of sufficient size (by area) to accommodate sufficient separation distances between the BESS and external Site boundary

- The APZ surrounding the BESS is defined in the Bushfire Threat Assessment (BTA) (discussed in **Chapter 15.0 Bushfire**). The BTA established that an APZ of 10.5 m would be required between the BESS and western boundary of the Site to achieve a BAL 12.5. For completeness, the BTA established that an APZ is not required to the northern, eastern, and southern boundaries of the Site.

Provided that the recommended management and mitigation measures summarised in **Section 16.5** are implemented, the risk associated with each battery cell and battery enclosure can be managed ALARP.

Loss of containment

Loss of containment of pollutant and/or irritant from the BESS (cooling water from the batteries) may occur during operation of the Project. The consequences of this event include pollution of the ground and potential run-off into local receiving waters. Notwithstanding, the quantities of potential pollutants are likely to be relatively minor.

Several preventative and protective strategies are available to mitigate the likelihood of this event occurring, which include:

- Establishing equipment selection requirements
- Preventative maintenance and equipment condition monitoring
- Implementation of automatic safety shut-off function(s) in case of safe limit exceedance.

Protection against loss of containment is promoted through batteries being specifically housed in dedicated enclosures, with only restricted personnel allowed within the Site. Spill clean-up equipment should be made available, used in accordance with a Pollution Incident Response Management Plan (PIRMP).

Provided that the recommended management and mitigation measures detailed in **Section 16.5** are implemented, the risk associated with the loss of containment can be managed ALARP.

Fire and pollution at MV and HV infrastructure

Fire at the MV and HV infrastructure can be caused by electrical faults. In addition, failure to capture and contain a loss of containment of oils may lead to pollution. Consequences of this event include arc flash and other types of fire in the HV/MV cable reticulation network, substation, BESS or transformers. Failure to contain a spill of oil may lead to pollution of ground and potential nearby receiving waters. While quantities are likely the be relatively minor, the application of risk management strategies would reduce the likelihood of the event occurring.

Preventative and protective strategies to manage the consequence and likelihood of event occurrence include:

- Establishing equipment selection requirements
- Preventative maintenance and equipment condition monitoring
- Implementation of a fire suppression system
- Installation of protective barriers or solid covers as per AS 2067, to limit the extent of damage to arc flash and transformer fires
- Provision of secondary containment, during unloading or handling of oil at the transformers.

Provided the requirements under AS 2067 and AS 1940 are implemented, and management practices are adhered to, the risk associated with fire and loss of containment at the MV/HV infrastructure can be managed ALARP.

Exposure to electromagnetic fields (EMF)

Operation of the Project may lead to exposure to EMF at any electrical infrastructure at the BESS and the 22 kV transmission line. While operational, electrical equipment produces an electric and a magnetic field. The electric field is associated with the voltage of the equipment and the magnetic field is associated with the amperage. In combination, these fields cause energy to be transformed along electrical wires. Importantly, the electric and magnetic fields associated with electrical equipment, whilst interrelated, are not dependant on each other. As a result, they can exist independently.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) states that there is no established scientific evidence that exposure to EMF causes adverse health effects. Notwithstanding, EMF has been considered as a potential event in the PHA.

Typical values of magnetic fields measured near powerlines and substations are provided in **Table 16-6** (reproduced from Table 9 in **Appendix I**).

Table 16-6 Typical values of magnetic fields measured near powerlines and substations

Source	Location of measure	Range of measurement (mG)
Substation	At substation fence	1 – 8
Transmission line (HV)	Directly underneath	10 – 200
Transmission line (HV)	At edge of easement	2 – 50
33 kV underground cable	At one metre above ground level	10
	20 metres from source	Indistinguishable from background magnetic field
BESS	Outside battery enclosure	1 – 8

ARPANSA has adopted the international guideline published by ICNIRP in 2010. The reference levels set out in the guideline are derived from the levels at which interactions with the central nervous system are established. The reference levels established by ICNIRP and adopted by ARPANSA are provided in **Table 16-7**.

Table 16-7 ICNIRP guideline reference levels

Parameter	Reference level
Electric field	5,000 volts per metre (V/m)
Magnetic field	2,000 milligauss (mG)

The magnitude of the EMF at a location is inversely proportional to the distance from the current carrying elements. As such, increasing the distance between the conductor and the receiver is a valid approach to managing EMF exposure. All buildings are located a distance away from any HV/MV equipment, which would subsequently reduce EMF exposure to site personnel.

Given the nominated separation distances between the BESS and the transmission line from the office building, and the large distance to other receptors, the Project is not likely to have an impact on sensitive receptors, including at neighbouring industrial sites. Ultimately, it is unlikely that the EMF generated by the Project would exceed the ICNIRP occupational exposure reference level. Consequently, the risk of EMF exposure would be considered to be managed ALARP.

Other hazardous events

The worst-case consequence identified for the Project is associated with a fire event in the BESS, initiated through thermal runaway or an electrical fault. Other high consequence events relate to electrical fires and high energy events at the BESS or the transmission line (as discussed in **Section 16.4.2** above). Provided construction and management of plant infrastructure adheres to relevant Australian Standards, the risk can be managed ALARP. The final high consequence hazard relates to loss of containment of, and consequent environment pollution from the Project (discussed in **Section 16.4.2** above).

In addition to these high consequence events the PHA also considered:

- The potential for natural hazards such as bushfire, lightning, earthquakes, wildlife interference and dust storms to have an impact on the Project
- Onsite traffic hazards that lead to serious damage of plant, resulting in the initiation of a hazardous incident scenario.

Given the low likelihood of these events occurring, the subsequent discussion has been summarised in **Table 16-8**.

Table 16-8 Other hazardous events

Scenario	Consequence	Management and evaluation
Natural hazards	Natural hazards have the potential to damage infrastructure that can lead to the initiation of fires, hazardous exposure or pollution incidents.	The main strategies for managing against a bushfire event is detailed in **Chapter 15.0 Bushfire**. Lightning risks are managed through earthing of electrical equipment and lightening protection masts.
Security breach	Security breach has a potential to lead to serious damage of plant and equipment, which could result in the initiation of a hazardous incident. Apart from personnel hazard and asset damage, a security breach may lead to the initiation of incidents resulting in fire, release of corrosives and environmentally pollutant material.	The Project area would operate under a security protocol. The Project infrastructure would be located in secured areas behind security fencing.
On-site traffic events	Traffic impacts against or involving Project infrastructure may lead to the initiation of incidents resulting in fire, release of corrosives and environmentally pollutant material.	Prevention and protection measures would include a dedicated ring road and reduced speed limits at the Site.

16.5 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to manage potential hazards and risks are listed in **Table 12-14**.

Management and mitigation measures in other chapters that are relevant to the management of hazards and risk include:

- **Chapter 11.0 Soils, groundwater and contamination**, specifically measures which address management of potential spills and leaks during construction and operation
- **Chapter 14.0 Surface water, flooding and water use**, specifically measures which address spill avoidance and containment during operation
- **Chapter 15.0 Bushfire** specifically measures which relate to the implementation of an APZ.

Table 16-9 Summary of safeguards and management measures – Hazards and risk

ID	Management and mitigation measure	Timing
HR1	All hazardous substances that would be required for construction and operation would be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), *AS 1940: The Storage and handling of flammable and combustible liquids* (as applicable) Hazardous and Offensive Development Application Guidelines (Applying SEPP 33) (Department of Planning, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (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 materials in excess of storage thresholds, a risk management strategy would be developed on a case-by-case basis.	Construction
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 DPIE, 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 I 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;	Operation

ID	Management and mitigation measure	Timing
	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.	

17.0 Other matters

A risk assessment was undertaken in **Chapter 7.0 Environmental scoping assessment** to determine the key issues and prioritise the scope of work for each environmental matter. Consistent with the outcome of the risk assessment summarised in **Table 7-1**, the following matters were considered low priority risks:

- Landscape and visual
- Social and economic
- Waste management
- Air quality
- Cumulative.

Commensurate with the low level of risk, each matter has been briefly discussed in this chapter. For consistency, the discussion of each matter is presented in the format detailed in **Section 7.4**; albeit consolidated.

17.1 Secretary's Environmental Assessment Requirements

Table 17-1 sets out the SEARs relevant to visual, socio-economic, waste and cumulative impacts and where the requirements have been addressed in this EIS.

Table 17-1 SEARs – Other matters

Relevant SEARs	
Visual	**Where addressed**
The EIS must include: An assessment of the likely visual impacts of the development (including any night lighting) on surrounding residences, scenic or significant vistas	An assessment of the potential visual impacts of the Project is provided in **Section 17.2.3**
Socio-economic	**Where addressed**
This EIS must include: An assessment of the likely impacts on the local community, demands on Council infrastructure and a consideration of the construction workforce accommodation	**Section 17.3** includes an assessment of the likely impacts on the community, demands on Council infrastructure and consideration of the construction workforce accommodation. Consultation with Broken Hill City Council regarding demands on their infrastructure is detailed in **Chapter 13.0 Transport and access** and **Chapter 14.0 Surface water, flooding and water use**. Potential economic benefits and costs are also detailed in **Section 17.3.3**
Land – including an assessment of the potential impacts of the development on existing land uses on the site and adjacent land	An assessment of potential land use impacts of the Project is provided in **Section 17.3.3**
Waste	**Where addressed**
This EIS must: Identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste	**Section 17.4.4** identifies the potential waste impacts of the Project. **Table 17-8** identifies the potential construction waste types and indicative quantities, the NSW EPA Waste Classification and the proposed handling, treatment and/or disposal methods.

Relevant SEARs	
	Potential waste sources during operation are discussed in **Section 17.4**. Given that waste generation during operation would be minimal, waste sources have not been quantified. Management and mitigation measures to manage, reuse, recycle and safely dispose of waste are included in **Section 17.7**.
Cumulative impacts	**Where addressed**
The EIS must include: An assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice	Potential cumulative impacts of the Project and existing or proposed developments in the region are considered in **Section 17.6**.
Noise – including an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria	Potential cumulative noise impacts of the Project and other developments within the vicinity are considered in **Section 17.6.5**.
Transport – including a cumulative impact assessment of traffic from nearby developments	Potential cumulative transport impacts of the Project and other developments within the vicinity are considered in **Section 17.6.5**.

17.2 Visual impact

17.2.1 Methodology

The visual impact assessment for the Project involved:

- Identifying the existing visual conditions at the Project Area and surrounds, including sensitive receivers
- Undertaking a desktop study to identify the 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 Project in accordance with **Table 17-2**
- Identifying management and mitigation measures to minimise the potential impacts to visual amenity.

Table 17-2 Visual impact rating matrix (adapted from Transport for NSW, 2020)

Visual sensitivity	Magnitude of change			
	High	**Moderate**	**Low**	**Negligible**
High	High	High-moderate	Moderate	Negligible
Moderate	High-moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

17.2.2 Existing environment

Site context

The Project is located within a relatively flat landscape, which is mostly dominated by open land and industrial and commercial operations. The Site 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 Site. Approximately 100 metres to the north of the Site 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.

The area immediately west of the Site includes an ephemeral watercourse and an unsealed vehicle track. Limited flora and fauna habitat are present in this area, which appear to be in both a degraded and moderate condition. The TransGrid Broken Hill substation is approximately 200 metres west of the Site, which is surrounded by vegetation in a degraded condition. The Broken Hill Solar Plant is located further west, about 1.5 kilometres from the Site.

Several existing transmission and distribution lines are present in the surrounding landscape, including to the immediate west of the Site, and to the north following the railway line, and south along Pinnacles Road.

There are no crossings within the vicinity of the Site on Pinnacles Place, and limited pedestrian footpaths. The Site is not serviced by public transport.

The nearest residential property is located approximately 1.1 kilometres to the south of the Project Area. The nearest residential area is approximately 1.6 kilometres to the north-east of the Project Area. Further detail on the Site context is provided in **Section 2.2**.

Topography

The Site is relatively flat and slopes downwards slightly along a north-west to south-east gradient, from approximately 284 to 283 metres Australian Height Datum (AHD) across a distance of approximately 100 metres.

17.2.3 Impact assessment

Representative viewpoints selected to assess the visual impacts of the Project are shown on **Figure 17-1**. Potential receivers and the sensitivity of each viewpoint are as follows:

- **Viewpoint 1: View north-west from Pinnacles Place** – Potential receivers at this viewpoint would generally be industrial workers and road users who may experience passing views. Views from this viewpoint would be partially intercepted by warehouse structures. Given that there are no pedestrian footpaths, it is likely that there is low pedestrian activity at this viewpoint. This view would be of low sensitivity. This viewpoint is considered representative of all viewpoints within the industrial estate.

- **Viewpoint 2: View north from Pinnacles Road** – Pinnacles Road may provide road users passing views of the Site; however, these would be largely intercepted by existing industrial structures. Given that views would be intercepted and experienced at speed, this view would be of negligible sensitivity.

The existing view from each viewpoint is shown in **Figure 17-2** and **Figure 17-3**.

AECOM

N

0 30 60 m

Legend

- Project Area
- Site
- Railway
- Indicative overhead transmission line
- Indicative transmission line pole
- Viewpoint location

FIGURE 17-1:
VIEWPOINTS

Source: © Department of Customer Service 2020

Figure 17-2 Viewpoint 1 – View north-west from Pinnacles Place

Figure 17-3 Viewpoint 2 – View north from Pinnacles Road

Construction

A visual impact assessment was undertaken for each viewpoint with regard to construction impacts. A summary of the assessment is detailed in **Table 17-3**.

Table 17-3 Construction visual impacts

Viewpoint	Discussion
Viewpoint 1: View north-west from Pinnacles Place	Construction activities and equipment would be temporarily visible to receivers from this viewpoint, including higher elements such as cranes and elevated work platforms. Construction of the transmission line may also be visible within the background of the view. Vehicles may also be seen accessing the Site via Pinnacles Place. Due to the visual compatibility of construction activities with the surrounding industrial uses present in the area, the magnitude of change would be low. As the sensitivity of the viewpoint is low, visual impacts would be considered low.
Viewpoint 2: View north from Pinnacles Road	During construction, construction activities may be visible from this viewpoint, including elevated equipment such as cranes and work platforms, and construction of the transmission line. However, this change would be partially intercepted by existing structures south of the Site and would be difficult to see by the receptors likely to be passing at speed along Pinnacles Road. Therefore, the magnitude of change would be low. Given that the sensitivity of the viewpoint is negligible, visual impacts would be considered negligible.
Night-time visual impacts	Construction of the Project would generally be carried out during standard construction hours. During night-time, low level security lighting would be present at the Site. Impacts would be negligible given the low volume of receivers expected to be present at night, distance to residential receivers and the potential for lighting to be absorbed into the wider industrial setting.

An overview of the visual impact assessment ratings from each representative viewpoint during construction is provided in **Table 17-4**.

Table 17-4 Visual impact assessment – construction

Viewpoint	Sensitivity	Magnitude of change	Visual impact rating
Viewpoint 1: View north-west from Pinnacles Place	Low	Low	Low
Viewpoint 2: View north from Pinnacles Road	Negligible	Low	Negligible

Operation

A visual impact assessment was undertaken for each viewpoint with regard to operational impacts. A summary of the assessment is detailed in **Table 17-5**.

Table 17-5 Operation visual impacts

Viewpoint	Discussion
Viewpoint 1: View north-west from Pinnacles Place	Operational elements of the Site such as the operational parking area, transformers and battery units would be visible from this viewpoint. Transmission line towers would also be visible in the background of the view. Visible elements would be compatible with the industrial setting of the surrounding area and would align with the other electrical infrastructure in the local landscape. As such, the magnitude of change is expected to be low. As the sensitivity of the viewpoint is considered to be low, the overall visual impact at this viewpoint would be low.
Viewpoint 2: View north from Pinnacles Road	During operation, elements of the Site and the transmission line poles may be viewed at speed by receptors passing along Pinnacles Road. This would, however, be absorbed into the industrial context of the surrounding landscape, which includes existing transmission lines, and partially concealed by intervening structures. The magnitude of change is, therefore, expected to be negligible. Given that the view is of negligible sensitivity, the overall visual impact would be negligible.
Night-time visual impacts	During night-time, there would likely be low level lighting for security purposes at the Site. Impacts would be negligible given the low volume of receivers expected to be present at night, distance to residential receivers and the potential for lighting to be absorbed into the wider industrial setting.

An overview of the visual impact assessment ratings from each representative viewpoint during construction is provided in **Table 17-6**.

Table 17-6 Visual impact assessment – operation

Viewpoint	Sensitivity	Magnitude of change	Visual impact rating
Viewpoint 1: View north-west from Pinnacles Place	Low	Low	Low
Viewpoint 2: View north from Pinnacles Road	Negligible	Negligible	Negligible

Conclusion

Overall low to negligible visual impacts are expected to result from the construction and operation of the Project.

17.3 Social and economic

17.3.1 Methodology

This social impact assessment has addressed the direct and indirect impacts and benefits of the 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.

As per the SEARs for the EIS, potential impacts on Broken Hill City Council infrastructure and construction workforce accommodation have also been taken into consideration.

This social impact assessment has been informed by stakeholder and community consultation undertaken for the Project including:

- Meetings with Broken Hill City Council, BHLALC, and NSW Government agencies
- Consultation and briefings with the community generally, particularly surrounding landowners.

Issues raised during these consultations included:

- Understanding the scope of the Project
- Air quality impacts
- Dust and traffic generation during construction.

Further details regarding consultation undertaken for the Project (up to the submission of the EIS) are provided in **Chapter 6.0 Consultation**.

17.3.2 Existing environment

Demographic profile

Detail of demographic indicators ABS 2016 census data were reviewed. The key relevant statistics for this assessment include:

- The total population of the Broken Hill LGA is 17,708
- The median age is slightly above that of the Greater Sydney area, being 45 compared to 36
- The proportion of the population of people born overseas across the study area is lower than the Greater Sydney region, being around 13 percent compared with 40 percent
- Education levels and post-school qualifications in the Broken Hill LGA are lower than the Greater Sydney average, with higher unemployment rates in the Broken Hill LGA than Greater Sydney
- The top employment industry differs between the two regions, with the Broken Hill LGA's top employment industry being Silver-Lead-Zinc Ore Mining and Greater Sydney's being hospitals (except psychiatric hospitals)
- Almost 95 percent of the housing stock in the Broken Hill LGA is a separate house. This is in contrast with Greater Sydney where only 57 percent of the housing stock is separate housing
- Household size, in terms of number of people, is generally lower in the Broken Hill LGA compared to Greater Sydney. Compared to Greater Sydney, median weekly household income is lower in the study area which is $965 compared to $1,750 for Greater Sydney. Mortgage payments are significantly lower in the Broken Hill LGA at $953 a month compared with $1,750 a month in

Greater Sydney. The average weekly rental payment in Broken Hill LGA is $190 compared with $440 in Greater Sydney

- The predominate mode of travel to work across the Broken Hill LGA is by car (around 70 percent), being higher than the Greater Sydney average (around 53 percent). The proportion of people travelling to work by public transport is lower in the Broken Hill LGA compared to Greater Sydney (approximately 16 percent).

Community values

Community values refer to the set of principles or ethics that are generally shared by a community group such as residents, businesses or visitors in relation to their local area. This includes shared visions around the enhancement of quality of life or sense of place and the future identity of the community as a whole.

While focusing primarily upon community values at the local government level, the unique nature of this Site and the importance of Broken Hill in contributing to the growth of far west regional NSW means that the social objectives contained within broader strategic plans should also be recognised.

Relevant plans for identifying community values include the *Far West Regional Plan* (Department of Planning and Environment), *Broken Hill Local Strategic Planning Statement* (Broken Hill City Council, 2020) and the *Broken Hill 2033 Community Strategic Plan* (Broken Hill City Council, 2017). The consistency of the Project with these objectives is considered in **Chapter 5.0 Strategic and statutory context**.

Property and land use

The Project Area is located within a IN1 General Industrial Zone under the Broken Hill LEP (refer to **Figure 2-1**). The Site is owned by Galena Developments Pty Ltd and Globe IBH Pty Ltd, as tenants in common in equal shares. For the wider Project Area, the Broken Hill substation is owned by the Electricity Transmission Ministerial Holding Corporation (ETMHC) and operated by TransGrid, and the land that would be used for the installation of an overhead transmission connection is freehold land that is owned by the NSW government and is a portion of the Willyama Common and is therefore classified as Commons. Further detail on the existing use of the Project Area is provided in **Chapter 2.0 Project Area context and background**.

Social and Council infrastructure

Social infrastructure refers to the facilities, structures and services that support the physical, social, cultural or intellectual development or welfare of the community. This includes a range of physical facilities such as schools, medical centres, sporting and recreational facilities (including passive open space), community facilities, libraries, and the activities and programs that operate within them.

Given the industrial nature of the surrounding area, there is no social infrastructure present within a one kilometre radius of the Project Area.

Key Council infrastructure within the vicinity of the Project Area includes the local transport network potable water and wastewater systems.

The Site is not serviced by public transport and no pedestrian footpaths or crossings are located on Pinnacles Place. The primary access route to the Site is via Pinnacles Road, a sealed road which in turn connects to Kanandah Road, a sealed road located to the east of the Site. Further information on the local transport network is provided in **Chapter 13.0 Transport and access.**

There is an existing water main that runs along Pinnacles Place, with a single water hydrant located in front of the Site. There is also an existing sewer main that runs along the western boundary of the Site. Further information on potable water and wastewater systems within the vicinity of the Project Area is provided in **Chapter 14.0 Surface water, flooding and water use**.

Visitor accommodation

A range of short-term visitor and tourist accommodation options are available in the Broken Hill LGA, including hotels and motels, serviced apartments, tourist and caravan parks, cottages and bed and breakfasts. Some of the major accommodation providers in the Broken Hill city centre include the following:

- Away Cottages Broken Hill
- Broken Hill Oasis Motor Inn (15 units)
- Broken Hill Tourist Park
- Comfort Inn Crystal (42 rooms)
- Gateway Motorway Inn
- Hilltop Motel (29 rooms)
- Ibis Styles Broken Hill Hotel (42 rooms)
- Lodge Outback Motel
- Red Earth Motel (19 units)
- Palace Hotel (48 rooms)
- Sturt Motel Broken Hill (20 rooms).

The number of rooms or units at each accommodation provider has been listed, where known.

17.3.3 Impact assessment

Amenity

Amenity refers to the quality of a place, its appearance, feel and sound, and the way its community experiences the place. 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 aspects are considered below.

Table 17-7 Social and economic impacts

Consideration	Impact
Amenity	
Noise and vibration	Exposure to noise and vibration has the potential to create nuisance, intrude on daily activities or the enjoyment of these activities, interfere with concentration and memory, disrupt sleep and rest patterns and create or exacerbate health concerns. Construction and operational noise generated by the Project would comply with all project specific noise levels at residential receivers, with only minor exceedances experienced during construction at non-residential receivers (refer to **Chapter 12.0 Noise and vibration**).
Traffic	Changes to the level of traffic has the potential to affect amenity, with increased traffic giving rise to elevated noise and air quality impacts, as well as congestion and visual clutter. An increase in traffic volume also has the ability to affect people's travel, including trip duration, wait times at intersections, road safety and access to properties and community infrastructure. Construction traffic impacts during the construction of the Project are temporary and minor in the context of the b-double approved traffic route that would be utilised by the Project construction vehicles, and the industrial land within which the Project would be undertaken. Operational traffic impacts would be negligible as the Site would be largely unmanned. Further detail regarding traffic during the construction and operation stages of the Project is provided in **Chapter 13.0 Transport and access**.

Consideration	Impact
Visual amenity	The existing Site is currently used as a storage area for equipment, vehicles and other materials. The vegetation on the Site is in a degraded state with broad areas of bare sand present and, as such, there is limited fauna habitat. The majority of the facility would be no greater than approximately 10 metres in height with the exception of the transmission line landing gantry, which would be approximately 30 metres tall. Batteries are expected to be mounted on concrete footings and be containerised or otherwise enclosed. Visual impacts would be low to negligible for the Project.
Air quality	Construction has the potential to generate nuisance dust. The construction dust assessment methodology identified the risk of increased dust and air emissions from construction activities to be negligible with the application of appropriate mitigation measures in place to control construction dust (refer to **Section 17.5**).

Based on the above discussion, the overall magnitude of these impacts is considered low and negligible. The sensitivity of receivers within this area is low based upon the Site being in an industrial land use zone and the surrounding receivers existing exposure to amenity impacts of the industrial nature of the area. As such, the overall socio-economic impact of changes to local amenity associated with the Project would be low and negligible.

Property and land use

The construction of the Project would temporarily alter the land use of the Site from an industrial premise to a construction site, however this would be limited to the construction time frame. During construction of the transmission line, the transmission line corridor would be less impacted but would include construction activity within the existing semi-vegetated open space. The TransGrid Broken Hill Substation would remain operational.

During operation, the Project Area is expected to remain zoned as IN1 General Industrial. The presence of the BESS would remain consistent with the industrial land use zoning of the Project Area and would not adversely influence the beneficial use of the surrounding land. The operation of the TransGrid Broken Hill Substation would not be affected by the operation of the Project.

The Project's magnitude of impact upon land use is considered to be low and would only relate to the inclusion of an additional transmission line crossing the Lot 7302 DP1181129. A number of transmission lines already cross this land and, therefore, the sensitivity of the receptor (i.e. the existing land use within the Project Area and other land uses on surrounding land) is deemed to be low, with the overall significance of impact being low and negligible.

Social and economic impacts

The operation of the Project would provide islanding functionality and may assist in providing a reliable energy supply to Broken Hill in the event of a separation from the grid. This would provide economic and social benefits by helping to reduce disruptions to energy supply at Broken Hill, for example through avoiding power shortages.

Furthermore, the firming capacity to the NEM and energy storage provided by the Project would enhance the utilisation, reliability and efficiency of renewable energy use throughout Broken Hill and the wider region. Through providing this firming capacity, the Project also has the potential to support the development of new renewable energy projects in NSW. These projects would provide further corresponding social and economic benefits, such as job creation and income generation.

Other social and economic benefits associated with the Project include:

- Job creation – the Project would require drivers delivering building materials and equipment, including excavation and earthmoving equipment. The Project would employ up to 50 full-time equivalent (FTE) positions during construction and up to three staff during normal operation. Where possible, employees and construction equipment would be sourced from the local area or region

- Generation of income – the Project would generate income within the local and wider community by providing income for direct and indirect employment, together with the multiplier effect of Project income expenditure. This would provide a small boost to the local economy
- Supply of goods and services – local businesses would benefit from the Project by providing the Project with general goods and services, including accommodation for the construction workforce.

Infrastructure demand

It is expected that the Project would be connected to the existing potable water reticulated services on the Site and to the existing sewer main which traverses the western boundary of the Site. As such, the Project would result in a minor increase in demand for potable and sewerage infrastructure during construction and operation. This potential impact is discussed in detail in **Chapter 14.0 Surface water, flooding and water use**.

As detailed in **Chapter 13.0 Transport and access**, impacts on demand on the local road network would be negligible during construction and operation. A Construction Traffic Management Plan (CTMP) would be prepared, in consultation with relevant stakeholder and Broken Hill City Council, to manage potential impacts during construction(refer to **Chapter 18.0 Management and mitigation measures**).

Given that there is no social infrastructure present within one kilometre of the Project Area, the Project is not anticipated to impact upon the use of or demand for social infrastructure.

Construction workforce accommodation

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

Given the relatively low volume of construction workers and availability of accommodation, it is anticipated that the construction workforce would be able to be accommodated in the Broken Hill LGA. The use of locally sourced workers, where practicable, would further reduce the need for construction worker accommodation. Accommodation of the construction workforce would, therefore, have a negligible impact on the availability of visitor accommodation in the Broken Hill LGA.

Conclusion

Overall, the Project would result in social and economic benefits, including assisting in providing reduced disruption to energy supply for Broken Hill and firming of the wider transmission network, support for further renewable energy projects, job creation and generation of income within the community. The Project has the potential to affect amenity as a result of changes to matters such as traffic and noise and vibration. These potential impacts would be minor and appropriately addressed through the implementation of various management and mitigation measures.

17.4 Waste

17.4.1 Methodology

A qualitative desktop assessment has been carried out to estimate waste types and quantities, to identify potential impacts, and to identify appropriate management measures. This involved:

- Identifying potential waste generating activities during construction and operation
- Estimating the likely waste streams and volumes, including bulk earthworks and spoil balance
- Identifying the likely classification of waste streams in accordance with relevant legislation and guidelines
- Describing proposed management and handling techniques for key waste streams, including waste storage and collection, minimisation and re-use.

The waste types and quantities estimated in this chapter are indicative and have been identified for the purpose of determining potential waste management options. Although the quantities of waste actually generated by the Project may differ from the estimates made, the identified waste management options are likely to be appropriate for the final waste quantities.

17.4.2 Waste management framework

The POEO Act is the primary piece of legislation for waste management and recycling in NSW. The POEO Act establishes the procedures for environmental control, and for issuing environment protection licences (EPLs) covering issues such as waste.

Under the POEO Act 'waste' is defined as:

a. *"any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment*

b. *any discarded, rejected, unwanted, surplus or abandoned substance*

c. *any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance*

d. *any processed, recycled, reused or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations*

e. *any substance prescribed by the regulations to be waste.*

A substance is not precluded from being waste for the purposes of this Act merely because it is or may be processed, recycled, re-used or recovered."

The Protection of the Environment Operations (Waste) Regulation 2014 (POEO Waste Regulation) regulates matters such as the obligations of consignors (producers and agents), transporters, and receivers of waste, in relation to waste transport licensing and tracking requirements within NSW.

The aim of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) includes " to encourage efficient use of resources, reduce environmental harm, and reduce waste generation in accordance with the principles of ecologically sustainable development." To meet the objectives of the Act, waste management options must be considered and selected in accordance with the following hierarchy:

- Avoidance of unnecessary resource consumption,
- Recovery of resources (including reuse, reprocessing, recycling and energy recovery),

Disposal. To support the waste management hierarchy, the NSW Waste Avoidance and Resource Recovery Strategy 2014 -21 (NSW EPA, 2014b) provides a framework and targets for waste management and recycling in NSW. Targets established under this strategy include:

- Avoiding and reducing the amount of waste generated per person in NSW
- Increasing recycling rates to 70 per cent for municipal solid waste, 70 per cent for commercial and industrial waste, and 80 per cent for construction and demolition waste
- Increasing waste diverted from landfill to 75 per cent
- Managing problem wastes better and establishing 86 drop-off facilities and services across NSW.

In NSW, waste is classified in accordance with the Waste Classification Guidelines 2014 (NSW EPA, 2014a) (the 'Waste Classification Guidelines'). Waste classification helps those involved in the generation, treatment and disposal of waste, ensure the environmental and human health risks associated with their waste is appropriately managed in accordance with the POEO Act and its associated regulations. Part 1 of the Waste Classification Guidelines provides advice and directions on classifying waste to achieve appropriate management of all waste types. Many waste types are pre-classified under the POEO Act and do not require testing. However, if a waste is not pre-classified, it may need to be tested to determine its classification.

Waste material generated from the Project would be classified in accordance with these guidelines. The following waste classifications are relevant to the Project:

- Special waste
- Liquid waste
- Pre-classified waste, including:
  - General solid waste (putrescible)
  - General solid waste (non-putrescible)
  - Restricted solid waste
  - Hazardous waste.

At a local level, development within the Broken Hill LGA is subject to the controls specified in the Broken Hill Development Control Plan 2016 (DCP). The DCP includes general controls relating to waste for development within industrial zones, including the requirement that open areas for waste storage be screened from public view and suitable provision be made for the storage and disposal of trade wastes and refuse such that it does not interfere with the amenity of the area.

17.4.3 Existing environment

The Site is located within an industrial precinct and is currently used as a storage area for equipment, vehicles and other materials. The Detailed Site Investigation (DSI) and Assessment undertaken for the Project (refer to **Chapter 11.0 Soils, groundwater and contamination**) identified the presence of waste materials across the Site such as metal, wood and tyre waste, vehicle batteries, infrastructure including truck drop trailers, mechanical fuels and oils stored in intermediate bulk containers, drums and jerry cans, and two stockpiles of material likely to be from the Site.

The DSI and Assessment (refer to **Appendix D Detailed Site Investigation and Assessment**) also identified a small spill where a hydrocarbon odour was observed from an intermediate bulk container on the southern boundary of the Site. The material at this location was classified in accordance with the NSW EPA waste classification guidelines as General Solid Waste, Restricted Solid Waste and Hazardous Solid Waste depending on depth.

The tenants occupying the Site are responsible for the ongoing management of waste generated by their industrial operations. More broadly, Broken Hill City Council provides a weekly general waste collection service for the industrial properties located on Pinnacles Place. Broken Hill City Council provides additional waste collection services as requested on application for a nominal fee.

The Broken Hill Community Recycling Centre is located approximately one kilometre north of the Site and operates as a waste transfer station and community recycling centre for the residents of Broken Hill along with providing:

- Domestic waste disposal
- Processing of green waste, compost and food waste
- Construction waste disposal
- Waste oil storage.

The waste depot receives more than 10,000 tonnes of domestic waste, 6,000 tonnes of commercial waste, 10,000 tonnes of building/demolition waste, 5,600 m^3 of industrial waste and 7,000 tonnes of green waste annually (Broken Hill City Council, 2005).

17.4.4 Impact assessment

Construction

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

- Excess spoil through site clearance activities and earthworks
- Contaminated fill through excavation of localised petroleum hydrocarbon impacted material at the Tank sample location
- Vegetation from the removal of shrubs and trees
- Packaging materials associated with items delivered to Site, 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
- Sewage wastes generated through the use of worker's facilities, such as toilets. During construction, portable toilets would be used to provide on-site toilet facilities. These would be serviced weekly and waste would be disposed of off-site at a processing location
- General office and domestic wastes, such as paper and food wastes.

A summary of the anticipated construction waste types is provided in **Table 17-8**, along with the likely waste classifications and the proposed handling, treatment and disposal methods.

Table 17-8 Potential construction waste types, classification and management methods

Waste types	NSW EPA Waste Classification	Indicative volume	Proposed handling, treatment and/or disposal method
Sewage	Liquid waste	>1000 litres per week	Pump-out for off-site disposal into existing sewer system
Fuels, lubricants and chemicals	Hazardous waste	Minimal	Off-site disposal at a licenced facility
Clean soils	General solid waste (non-putrescible)	Minimal	On-site re-use where possible. Where not possible, clean fill would be re-used on other project site/s or at a re-purposing facility. Note that spoil may be stockpiled on-site (e.g. within the ancillary facility areas) prior to re-use or disposal.
Contaminated soils	To be classified subject to results of testing	About 0.25 cubic metres	A Remedial Action Plan would be prepared in accordance with SEPP 55 for the excavation of soil material at the tank sample location; disposal would occur in accordance with the Soil and Water Management Plan and the Waste Management Plan prepared as part of the CEMP.
Excavated natural materials (ENM) or virgin excavated natural material (VENM)	General solid waste (non-putrescible)	Minimal	On-site re-use of topsoil for landscaping of the Site; off-site beneficial re-use or send to landfill site. Note that spoil may be stockpiled on-site (e.g. within the ancillary facility areas) prior to re-use or disposal.

Waste types	NSW EPA Waste Classification	Indicative volume	Proposed handling, treatment and/or disposal method
Green waste	General solid waste (non-putrescible) (garden waste)	Minor clearing volumes only	Separated, some chipped and stored on-site for landscaping, remainder to landscape suppliers or off-site recycling. Stumps and large trees would be sent to landfill.
General construction waste	General solid waste (non-putrescible)	Minimal	Off-site recycling and disposal.

Potential impacts associated with construction waste likely to be generated by the Project include:

- Spoil directed to landfill due to inadequate recycling and re-use
- Waste being unnecessarily directed to landfill, for example due to inadequate handling classification and disposal of waste on-site
- Contamination of soil, surface and/or groundwater from the inappropriate excavation, storage, transport and disposal of liquid and solid waste
- Risks to human health from the handling, storage, transport and disposal of contaminated waste generated by the Project
- Increased presence of pests due to incorrect storage, handling and transport of wastes.

As shown in **Table 17-8** all waste generated during construction would be removed as required. In order to avoid potential issues associated with odour generation, decreased visual amenity and creating environments that attract animals/pest species (e.g. rats and mice), waste removal would occur at regular intervals, or sooner as and when required.

With the implementation of a Construction Waste Management Plan and other management and mitigation measures provided in **Section 17.7** it is not anticipated that construction waste management activities for the Project would pose a significant risk to the environment or human health.

Operation

The operational phase of the Project is anticipated to generate the following broad waste streams:

- BESS facility operational equipment waste
- Site office waste
- Domestic waste/waste generated by workers.

General and recycling waste generation would primarily occur in the office and amenities area. Given that operation of the Project would employ up to three staff members, waste generated by workers would be minimal.

Waste generated by the operation of the BESS, such as end of life and defective battery cores would be handled either through a separate contract for chemical waste collection and recycling or by returning packaging materials to the product suppliers.

With the implementation of the management measures provided in **Section 17.7** it is not anticipated that operational waste management activities for the Project would pose a significant risk to the environment or human health.

17.4.5 Conclusion

Overall, the waste generated would be minor, and would be adequately managed by the management and mitigation measures proposed.

17.5 Air quality

17.5.1 Methodology

A qualitative desktop assessment has been carried out to estimate the potential air quality impacts associated with the construction and operation of the Project. This 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.

17.5.2 Existing environment

The background air pollution at the Site is characterised through ambient monitoring undertaken by DPIE at Broken Hill. The closest monitoring station to the Site is the Broken Hill Bureau of Meteorology monitoring site at Broken Hill Airport, approximately 4.5 kilometres south-east of the Site. 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 PM_{10}.

Data from the Broken Hill monitoring station have been extracted from the DPIE online data portal and summarised in **Table 17-9**.

Table 17-9 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.

For the purposes of assessing the climate and prevailing wind direction at the Site, the general climate data for the Broken Hill region have been assessed using the Bureau of Meteorology station located at Broken Hill Airport.

The warmest temperatures recorded occur between November and March, with the warmest average maximum temperatures occurring in January (33.7°C). The coldest temperatures are recorded in the winter months, with the lowest average minimum temperature occurring in July (4.8°C).

The highest average rainfall is recorded in January (28.1 mm), whilst June is the driest month (15.0 mm). Wind speeds are typically highest during spring with the average 9 am and 3 pm wind speeds exceeding 20 km/h. The lowest wind speeds occur in winter.

17.5.3 Impact assessment

Construction

During the construction phase, dust would potentially be generated by earthwork activities such as levelling and grading, excavation and trenching, as well as from vehicle movement on unsealed roads during dry weather.

Due to the relatively flat terrain of the Site, there would be no major cut and fill works or significant stockpiling of earth. A hardstand material would be used to construct the base of the BESS early in the construction phase to minimise the exposure of unsealed sand, soils and other materials.

Dust emissions could be generated from vehicles transporting workers to and from the Project Area, trucks delivering construction materials and machinery, such as excavators, graders and diesel generators.

Taking into consideration the works are not ongoing and will be conducted over a 12 month period, the location of the Site within an industrial zone, and the distance of the nearest residential receiver at 1.1 kilometres, air quality impacts during the construction phase are not considered to be significant and would be manageable through the implementation of standard dust suppression methods.

Operation

During operation, localised dust may potentially be generated from vehicles travelling on the access road for carrying out routine inspection works and maintenance activities. To minimise dust generation the access road would be constructed using a hardstand material. The impacts on local and regional air quality due to dust through the operational phase is expected to be negligible.

A key environmental benefit of the Project is that it enables greater renewable integration by providing storage, energy firming and improving system strength. This directly supports the Broken Hill Solar Farm and the Silverton Wind Farm, which will in turn, help reduce the use of electricity from that would otherwise be generated from conventional thermal power plants using fossil fuels. As such the Project will help reduce emissions of greenhouse gasses (GHG) that would otherwise be generated from conventional thermal power plants. The reduction in GHG emissions would have a positive impact on climate change and help facilitate the transition to a more diversified energy mix where renewable energy plays a larger part in providing electricity in line with NSW government policies and strategies.

17.5.4 Conclusion

The potential air quality impacts would be minor, and would be adequately managed by the management and mitigation measures proposed.

17.6 Cumulative impacts

17.6.1 Methodology

This assessment has been prepared to assess potential cumulative impacts of the Project when considered alongside other developments in the surrounding area.

Cumulative impacts can occur when the residual impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect on the environment, businesses or local communities. Cumulative impacts may occur when projects are constructed or operated concurrently or consecutively. Projects constructed consecutively can have construction activities occurring over extended periods of time with little or no break in construction activities.

This assessment involved:

- Outlining the residual impacts of the Project
- Identifying projects within the vicinity of the Project Area
- Applying a screening process to consider the potential for the identified projects to interact with the Project
- Identifying potential cumulative impacts (if any) of the Project and nearby projects.

17.6.2 Residual impacts

As noted above, the first stage in the cumulative assessment process is to understand the adverse residual impacts of the Project.

The Project has the potential to cause a number of environmental impacts. These have been grouped, assessed and discussed under different environmental aspects (refer to **Chapters** 8.0 - **17.0**). For all of these aspects, there are expected to be no significant residual impacts, and for some, only minor residual impacts as a result of the Project on any of the identified receptors. Provided the management and mitigation measures identified in **Chapter 18.0 Management and mitigation measures** are implemented and remain effective, there would be no likely residual adverse impacts for the following aspects given the existing environment:

- Chapter 9: Aboriginal heritage
- Chapter 10: Non-Aboriginal heritage
- Chapter 15: Bushfire
- Chapter 16: Hazards and risks
- Chapter 17: Other matters
    - Landscape and visual
    - Social and economic
    - Waste
    - Air quality.

For the remaining aspects (Biodiversity, Soil, groundwater and contamination, noise and vibration, transport and access, surface water, flooding and water use), further investigations have been undertaken as the Project could generate residual adverse impacts (albeit non-significant impacts).

17.6.3 Identification of nearby projects

A search of publicly available information has been undertaken to identify existing and potential projects in the vicinity of the Project. This includes projects that are under construction, approved, or proposed. Resources used for this include:

- Department of Planning, Industry and Environment (DPIE) Major Projects Website: (https://www.planningportal.nsw.gov.au/major-projects)
- Broken Hill City Council's Development Application Tracker: (http://datracker.brokenhill.nsw.gov.au/Home/Disclaimer)
- A review of the 'current projects' of other government agencies and utility providers who may be undertaking works in the vicinity of the Proposal (including TransGrid, Australian Rail Track Corporation (ARTC) and Transport for NSW).

The following was considered:

- Applications that are proposed or on exhibition
- Applications that have completed exhibition but are not yet determined
- Applications that have gained development approval but are not yet fully operational.

Local development applications and modifications to existing approvals which were determined in 2019 or earlier have been assumed to be completed and/or operational.

17.6.4 Screening process

Screening of the identified projects was undertaken to investigate their potential to interact with the Project. If a project was assessed to have no likely relationship to the Project in terms of potential cumulative impacts, it was excluded from any ongoing consideration.

Projects in the surrounding area that may affect the same receptors where impacts have been identified for the Project have been considered as part of the screening process. This was achieved by taking into account the following:

- Location – projects in proximity to the Project Area where there is potential for impacts to spatially overlap (e.g. shared use of roads for construction access)
- Timeframe and planning approval – only projects likely to be built concurrently or consecutively with the Project have been included for further assessment. This includes projects currently under construction and/or projects that have received planning approval (as at the time of preparing the Environmental Impact Statement for the Project). Projects at a conceptual or pre-approval stage have been considered; however, they are generally not assessed in detail due to an absence of project and/or environmental impact details or development timeframes. Projects that are operational have already been considered as they form part of the existing environmental baseline for each environmental aspect assessed in this EIS.
- Scale – larger scale projects identified on the DPIE's Major Projects website and Broken Hill City Council's development application register have been included as these are more likely to result in cumulative impacts.

The complete list of projects subject to the screening process is provided in **Table 17-10**.

Table 17-10 Screening of known projects near the Project

Project, proponent and status	Relative location	Proposed construction timeframe	Project details	Initial screening
Rasp Lead/Zinc/Silver Project (State Significant Development) - Modifications Broken Hill Operations Pty Ltd Approved, with several modifications proposed	Approximately three kilometres east of the Project Area	Operational until 2026 Construction timeframe of modifications are unknown	The Rasp Lead/Zinc/Silver Project is an operational underground mine. The existing operations include underground mining operations, a processing plant producing zinc and lead concentrate, a rail siding for concentrate dispatch and various supporting infrastructure. Two modifications to the approval are currently proposed: • Proposed Modification 8 – proposal to extend existing underground mining activities across the project's mining lease (CLM7) to a predefined region of an adjacent lease (ML1249) under a sub-lease arrangement with Perilya Broken Hill Limited (Southern Operations). There are no additional surface activities associated with the modification. • Proposed Modification 6 – proposal to allow for tailing to be co-deposited with excess waste rock from underground mining operations into Kintore Pit, located within the existing mine footprint. This would also require relocation of the underground mine access portal and decline. Other minor additional works are also proposed.	The proposed modifications of the Rasp Lead/Zinc/Silver Project are considered to be minor in nature and relate to existing mining activities. As such, they are not considered to have the potential to result in cumulative impacts and, therefore, have not been assessed further.

Project, proponent and status	Relative location	Proposed construction timeframe	Project details	Initial screening
Broken Hill Cobalt Project (State Significant Development) Broken Hill Cobalt Project Pty Ltd Scoping report lodged January 2020; SEARs issued February 2020	The cobalt mine site is approximately 24 kilometres south-west of the Project Area. A transformer, transmission line and buried water pipeline are proposed at least 125 metres west of the Project Area.	Unknown	Proposal for an open cut cobalt mine and associated infrastructure, about 24 kilometres south-west of the Project Area. The proposal also includes the provision of a 220 kV to 66 kV step down transformer, to be located adjacent to the existing TransGrid Substation. 66 kV power would be provided to the project site by overhead transmission wires and poles running parallel to the rail line. Alternative power generation options may also be considered. 1.5 gigalitres per annum of water would also be pumped to the project site from a metered take-off point on the western outskirts of Broken Hill in a buried pipeline adjacent to the railway line. The Scoping Report noted that the Broken Hill Cobalt Project is undertaking feasibility studies and a decision to mine is expected to be made in 2022/23. Construction of the proposed mine and processing plant would take approximately two years; however, the timeframe for construction is currently unknown.	The Broken Hill Cobalt Project has potential to result in cumulative impacts with the Project, should they be constructed concurrently or consecutively. However, it is unlikely that there would be an overlap in construction timeframes given that feasibility studies would conclude in 2022/23, and that construction would take about two years, noting that the construction of the Broken Hill BESS Project is anticipated to be completed in late 2022. As such, this project is not considered to have the potential to result in cumulative impacts, and therefore has not been assessed further.
Broken Hill Mineral Separation Plant – Modification 6 (State Significant Development)	Approximately 700 metres south-west	Unknown	Proposed modification to an operational mineral separation plant, including minor upgrades and reconfiguration of the plant. The Modification Report detailed the proposed modifications of the	The proposed modification may have potential to result in cumulative impacts with the Project if constructed concurrently. However, the modification is minor, and no

Project, proponent and status	Relative location	Proposed construction timeframe	Project details	Initial screening
Tronox (formerly BeMaX Resources NL) Proposed modification			operational mineral separation plant, including the minor upgrade and reconfiguration of the plant. The key modifications include the modification of the mineral separation process, inclusion of two additional stacks, upgrade of transport to the plant and the increase of construction hours to 24 hours per day, seven days per week. Construction of the proposed modification would occur over an approximate three month period, however the timeframe for construction is currently unknown.	construction timeframe is available. As such, the modification has not been assessed further.
Blue Bush Project (State Significant Development) Tellus Holdings Ltd Scoping report lodged October 2020, SEARs issued November 2020	The Blue Bush transfer site is approximately 2.2 kilometres west of the Project Area The Blue Bush facility is approximately 44 kilometres south of the Project Area	Unknown	Proposal for the construction and operation of a near-surface geological repository to accept, store and permanently isolate hazardous chemical waste materials. The proposal also includes construction and operation of an inter-modal logistics hub. The closest element of the proposal to the Project Area would be the Blue Bush transfer site. The Blue Bush transfer site would be used to receive waste (via rail) and temporarily store waste prior to its onward transfer to the Blue Bush facility.	The construction of the proposed Blue Bush transfer may have the potential to result in cumulative impacts with the Project if constructed concurrently. No construction timeframe for the Blue Bush Project is available. However, in order to provide a conservative assessment, potential cumulative impacts with the Project have been considered in **Section 17.6.5**.
Construction and operation of a Metallurgical Demonstration Plant	Approximately 720 metres east of the Project Area	Construction indicatively planned to	Proposal for the construction and operation of a Demonstration Plant to test and optimise the processing methodology prior for the Broken Hill	The proposed Demonstration Plant may have potential to result in cumulative impacts with the Project if constructed concurrently. No

Project, proponent and status	Relative location	Proposed construction timeframe	Project details	Initial screening
– 14 Kanandah Road, Broken Hill (Development Application) Broken Hill Cobalt Project Pty Ltd Approved March 2020		commence Q2 2020	Cobalt Project. A separate proposal has been lodged for the Broken Hill Cobalt Project. It is proposed to transport the bulk sample of ore or concentrate from the project site for the Broken Hill Cobalt Project to the Demonstration Plant site. The Statement of Environmental Effects for the proposal indicates that construction would indicatively commence in Q2 2020.	construction timeframes or detailed scope of works is available. However, in order to provide a conservative assessment, potential cumulative impacts with the Project have been considered in **Section 17.6.5**.
Addition to existing workshop – 7 Kanandah Road, Broken Hill (Development Application) S Thompson Proposed – Development Application lodged March 2021	Approximately 780 metres east of the Project Area	Unknown	Proposal for the erection of two steel portal framed extensions to an existing workshop and minor modifications to an existing driveway.	Given the minor nature of this proposal, the proposal is not expected to have potential to result in cumulative impacts with the Project. As such, it has not been assessed further.

17.6.5 Cumulative impact assessment

Based on the initial screening, the following projects were considered to have the potential to result in cumulative impacts with the construction of the Project, should they be constructed concurrently or consecutively:

- Construction and Operation of a Metallurgical Demonstration Plant (approved)
- Blue Bush Project (proposed).

The construction timeframes of these projects have not been confirmed. Notwithstanding, they have been considered in this assessment to provide an overview of the potential worst-case cumulative impacts associated with the Project.

Following a review of these projects, it has been determined that the potential residual impacts associated with these projects that have a potential to cause a cumulative impact with the Project relate to noise and vibration and transport and access only. This conclusion was based on the nature of the developments, i.e. their similarities (or lack of) with the Project, and their location, with many being some distance from the Project (with the nearest project located approximately 720 metres away). Other impacts have not been assessed further, given the limited residual impacts of the BESS, distance of identified projects and lack of detailed information publicly available in relation to the identified projects.

Noise and vibration

As identified in **Chapter 12.0 Noise and vibration**, construction noise and vibration impacts of the Project are anticipated to be minor. Marginal exceedances of criteria are anticipated to occur at non-residential receivers during construction. Exceedances are not predicted at residential receivers. Taking into consideration the existing traffic volumes on the Barrier Highway, traffic noise impact on residential receivers would also be minimal and would comply with the Project acoustic requirements. Furthermore, the implementation of minimum working distances of vibration intensive equipment to nearby receivers, no adverse impacts from vibration intensive works are anticipated. These potential impacts would be manageable with the implementation of standard mitigation measures.

During operation, the potential operational noise and vibration impacts of the Project are anticipated to be negligible.

Given this, the potential for cumulative impacts of the Project with other projects is negligible during construction and operation.

Transport and access

As identified in **Chapter 14.0 Transport and access**, construction traffic volumes during the construction of the Project are expected to be low.

The Statement of Environmental Effects for the proposed Metallurgical Demonstration Plant identified that the operation of the plant would generate up to 100 truckloads per week during the first stage of processing. This is expected to occur intermittently. Depending on the finalisation of the processing methodology, this may be significantly reduced to 1-5 truckloads per week. Construction or operational traffic volumes have not been identified for the Broken Hill Cobalt Project or Blue Bush Project.

Should construction of the Project and identified projects occur concurrently, there may be potential for minor increases in road traffic within the industrial area. However, given the location of the projects in an existing industrial area where heavy vehicle use is common and that the surrounding road network is largely under capacity, this is not expected to result in a significant cumulative impact.

During operation, traffic generated by the Project would be low (up to three light vehicles per day) and, therefore, would not contribute meaningfully to cumulative traffic impacts with other projects in the area.

Given this, the potential for cumulative impacts of the Project with other projects is negligible during construction and operation.

17.7 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential visual, socio-economic, waste, air quality and cumulative impacts are listed in **Table 17-11**.

Table 17-11 Management and mitigation measures – Other matters

ID	Management and mitigation measures	Timing
Visual impact		
V1	Lighting of the Site would be designed in accordance with *AS 4282:2019 Control of the obtrusive effects of outdoor lighting*	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
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,	Construction

ID	Management and mitigation measures	Timing
	volumes and management measures for waste and resources arising from/used for the Project	
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 undertaken of active excavation or stockpiling areas. The aim is to ensure visible dust is not moving off-site and that areas needing additional management measures be identified early. • Minimise exposed surfaces, such as stockpiles and cleared areas, including partial covering of stockpiles where practicable • Implement dust suppression measures on exposed surfaces, such as watering of exposed soil surfaces, dust mesh, water trucks and sprinklers to minimise dust generation • Establish defined Site entry and exit points to minimise tracking of soil on surrounding roads. Use wheel washes or shaker grids where the risk of off-site track out of dirt is identified • Cover heavy vehicles entering and leaving the Site to prevent material escaping during transport • Keep vehicles and construction equipment operating on-site well maintained and turned off when not operating (minimise idling on the Site) • Minimise the handling of spoil when excavating and loading of vehicles.	Construction

18.0 Management and mitigation measures

18.1 Secretary's Environmental Assessment Requirements

Table 18-1 sets out the Secretary's Environmental Assessment Requirements (SEARs) relevant to environmental management and where the requirements have been addressed in this EIS.

Table 18-1 SEARs – Environmental management

SEARs requirements	
Environmental management	**Where addressed**
The EIS must include: A consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS.	**Section 18.2** describes the overarching approach to environmental management during construction and operation of the Project. **Table 11-3** provides a consolidated summary of the proposed management and mitigation measures that would be implemented for the Project, as described throughout this EIS.

18.2 Proposed environmental management approach

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

- Management and mitigation measures
- Construction Environmental Management Plans (CEMPs) and sub-plans (refer to **Section 18.2.2**)
- Operational environmental management plan or system (refer to **Section 18.2.3**).

18.2.1 Management and mitigation measures

Management and mitigation measures that would be implemented for the Project to address potential environmental and social impacts are listed in **Table 11-3**.

Table 18-2 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 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

ID	Management and mitigation measure	Timing
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 exclusion zone around the area of PCT 155 in moderate condition, to ensure it would not be impacted by the Project • establish an exclusion zone so that the transmission line poles would not be placed within 10 metres either side of the 1st order stream • 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 *Biosecurity Act 2015* (Cth).	Construction
B2	Following construction activities in the transmission line corridor, 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 *Biosecurity Act 2015* (Cth).	Operation
B4	AGL would meet their offsetting requirements of this Project as determined by the BAM-C following detailed design.	Operation
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 • 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	Construction

ID	Management and mitigation measure	Timing
	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 (2016); 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 *State Environmental Planning Policy No 55 – Remediation of Land* 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. 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 • 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.	Construction
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	Construction

ID	Management and mitigation measure	Timing
	odorous soils are noted following the removal of this waste material or during construction of the Project.	
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 line corridor), samples of material would be collected to allow for waste classification in accordance with the NSW EPA (2014) *Waste Classification Guidelines*.	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 line 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 approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective.	Construction
Transport and access		
T1	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	Construction

ID	Management and mitigation measure	Timing
	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)	
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 *Managing Urban Stormwater: Soils and Construction – Volume 1* (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. • 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	Operation

ID	Management and mitigation measure	Timing
	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 line 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
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 *Planning for Bushfire Protection 2019* design and construction standards for property access roads (Table 5.3b).	Construction and operation
BF3	The vegetation clearance distance to any overhead transmission lines within the Project Area would comply with the document ISSC 3 Guideline for Managing Vegetation Near Power Lines (Industry Safety Steering Committee 2005).	Operation
BF4	A 'Bushfire Emergency Management and Evacuation Plan' would be prepared in accordance with the RFS document 'A Guide to Developing a Bushfire Emergency Management and Evacuation Plan' (RFS 2014) for the construction and operation phases of the Project.	Construction and operation
BF5	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	Operation

ID	Management and mitigation measure	Timing
	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.	
Hazards and risk		
HR1	All hazardous substances that would be required for construction and operation would be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), *AS 1940: The Storage and handling of flammable and combustible liquids* (as applicable) Hazardous and Offensive Development Application Guidelines (Applying SEPP 33) (Department of Planning, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (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 materials in excess of storage thresholds, a risk management strategy would be developed on a case-by-case basis.	Construction
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 DPIE, 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	Construction and operation

ID	Management and mitigation measure	Timing
	available, as detailed in a Pollution Incident Response Management Plan (PIRMP).	
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 I 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 *AS 4282:2019 Control of the obtrusive effects of outdoor lighting*	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
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'	Construction

ID	Management and mitigation measure	Timing
	• 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.	
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 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	Construction

ID	Management and mitigation measure	Timing
	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.	

18.2.2 Construction Environmental Management Plan

A CEMP would be prepared by for the Project. 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. Subplans are identified in **Section 18.2.1**.

18.2.3 Operational Environmental Management

Environmental performance during operation of the Project would be managed by the implementation of an operational environmental management plan (OEMP). The OEMP would be prepared to be consistent with the conditions of consent.

The OEMP would detail how the management and mitigation measures identified in **Section 18.2.1** 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 18.2.1**
- 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.

19.0 Project evaluation and justification

19.1 Secretary's Environmental Assessment Requirements

Table 19-1 sets out the requirements as provided in the SEARs relevant to environmental management and where the requirements have been addressed in this EIS.

Table 19-1 SEARs – Project evaluation and justification

Relevant SEARs	
General requirements	**Where addressed**
The EIS must include: • The reasons why the development should be approved having regard to: - Relevant matters for consideration under the *Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development - The suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses - Feasible alternatives to the development (and its key components), including the consequences of not carrying out the development • A detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter • A detailed evaluation of the merits of the project as a whole	This chapter provides an overview of reasons why the development should be approved. The objects of the EP&A Act are considered in **Section 19.4**. **Section 19.3** details how the principles of ecologically sustainable development have been applied to the Project. Other relevant matters for consideration under the EP&A Act have been considered throughout the EIS, including the following: • The provisions of relevant environmental planning instruments and regulation have been considered in **Chapter 5.0 Strategic and statutory context** • The likely impacts of the development have been assessed in **Chapters 8.0** to **17.0** • Consultation throughout the development of the EIS and future consultation is detailed in **Chapter 6.0 Consultation.** The following are considered in **Chapter 3.0 Project development and alternatives:** • The suitability of the Site and Project Area for the Project • Feasible alternatives for the Project, including a 'do nothing' option • Consideration of the capability of the Project to contribute to the security and reliability of the electricity system in the National Electricity Market. **Section 19.5** includes an evaluation of the merits of the Project as a whole, including discussion of how the Project is in the public interest.

19.2 Overview

This chapter outlines the justification for the Project given the likely impacts and the merits of the Project as a whole, along with the relevant legislative requirements.

19.3 Ecologically sustainable development

19.3.1 The principles

This section provides a review of the Project, its impacts and associated safeguards against the principles of ecologically sustainable development (ESD) in accordance with the *Environmental Planning and Assessment Regulation 2000* (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.

19.3.2 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 EIS is a public process which examines the potential effects of the Project. Therefore, the EIS process is considered precautionary in nature. The requirement to assess the impacts of the Project is a form of regulation designed to identify and address uncertainty about the effects of these activities.

This EIS has been prepared by experts in their respective fields and has identified and assessed the potential environmental impacts. Where there has been uncertainty in the prediction of impacts through the EIS process, a conservative approach was adopted to ensure the worst-case scenario was predicted in the assessment of impacts. For example, the noise and vibration assessment has conservatively assessed that all operational equipment on the Site would be operating concurrently, 24 hours a day, seven days a week. In response, appropriate management and mitigation measures have been developed to minimise potential environmental impact. Taking these measures into account, it is considered that there would be no threat of serious or irreversible damage to the environment as a result of the Project.

19.3.3 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 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 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 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 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 EIS has assessed the type and extent of potential impacts caused by the Project. The Project incorporates a range of management and mitigation measures to minimise potential impacts on the environment. These measures aim to maintain the environmental conditions within and surrounding the Project such that detrimental impacts do not affect the future health, diversity and productivity of the environment.

19.3.4 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 assessment has been undertaken by qualified specialists to assess the ecological values within the Project Area and surrounds, determine whether the Project is likely to have an impact on threatened biodiversity (refer to **Appendix B Biodiversity Development Assessment Report** and **Chapter 8.0 Biodiversity**). Through the proposed management and mitigation measures it is concluded that the Project would not have a significant adverse impact on the biological diversity or ongoing ecological integrity of the locality. The Project is clearing only low condition vegetation, and avoidance of clearing impacts will continue to be a key focus during detailed design. The Project would also include obtaining biodiversity credits to offset potential impacts.

19.3.5 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 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 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 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.

19.3.6 Compatibility with the Principles of ESD

In preparing the Project, 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.

19.4 Objects of the *Environmental Planning and Assessment Act 1979*

Consideration has been given to the consistency of the Project with the objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as outlined in the following sections.

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 Project 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 Project would 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 EIS assesses the Project and identifies the likely impacts on the environment and surrounding community. With the implementation of management and mitigation measures outlined in **Chapter 18.0 Management and mitigation measures**, residual impacts on the environment are anticipated to be negligible. Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby assisting to place a downward pressure on energy prices.

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

The Site is located within close proximity to key power utility infrastructure. In this location, the Project would deliver critical energy infrastructure that would support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region.

d. to promote the delivery and maintenance of affordable housing

The Project 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

This EIS presents a detailed assessment of the potential environmental impacts associated with the Project. The mitigation measures outlined within this EIS 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.

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

The Project is not anticipated to have an impact upon items of built or cultural heritage (including Aboriginal cultural heritage). No Aboriginal sites, objects or areas of PAD were identified during the survey of the Project Area. The RAPs present during the survey identified two lithic items which they considered might potentially be artefacts. While neither item satisfies technical criteria for identification as a stone artefact, as a precautionary measure, both were moved outside of areas of potential ground surface disturbance by attending RAP field representatives. Refer to **Chapter 9.0 Aboriginal heritage** for further detail.

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

The Project would be located in an existing industrial area. As an industrial facility, the design of the Project would be suited to its context. With the implementation of proposed management and mitigation measures, the Project would not adversely affect the amenity of the surrounding built environment.

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

The Project would be constructed and maintained in accordance with applicable Australian Standards and building codes and would be designed to meet fire prevention and suppression requirements under these standards. The Project 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 Project is to be assessed as SSD under Part 4 of the EP&A Act by the NSW Minister for Planning and Public Spaces or the Independent Planning Commission. Meetings have occurred with State agencies and local councils (Broken Hill City Council) and ongoing consultation would occur with these agencies regarding the Project and would continue through its implementation.

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

AGL has consulted with the local community and other relevant stakeholders regarding the Project, as documented in this EIS (refer to **Chapter 6.0 Consultation**). The development of the Project has considered the outcome of stakeholder consultation, and consultation with the local community would continue throughout the implementation of the Project.

The community and other stakeholders, namely adjacent neighbours, the nearest residential neighbour and Broken Hill LALC, will continue to be engaged throughout the EIS process. The EIS will be placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period community members and stakeholders have the opportunity to submit feedback to DPIE. Community engagement will also be maintained throughout the construction of the Project. Refer to **Chapter 6.0 Consultation** for further detailed.

19.5 Project justification

As the electricity sector moves away from coal generation, emerging technologies such as battery storage, are increasingly required to facilitate the transition to renewable energy generation by allowing electricity generated from renewable sources to be dispatched to the grid as needed. 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 when wind and solar resources are available, respectively. During the same period there has been progressive retirement of thermal generators from the NEM.

Both presently and into the future, there will be a requirement to provide energy storage and firming capacity to enable the transition from thermal generation to a renewable future. The Project would provide storage and firming capacity to the NEM as well as additional services to assist grid stability including frequency control ancillary services.

Battery storage presents an opportunity to provide a secure, affordable and modern energy system for NSW, thereby placing a downward pressure on energy prices. Furthermore, battery storage technologies are anticipated to be key to the development of Renewable Energy Zones under the NSW Government's *Transmission Infrastructure Strategy 2018*.

Broken Hill is situated at the end of a single 250 kilometre transmission line that runs north from the border of the State of Victoria. It currently has a maximum load of approximately 60 MW. In the event of failure of the transmission line, there are two 25 MW diesel-fired gas turbines operated by Essential Energy that are used as back-up electricity generators.

The recent rapid development of renewable energy projects in south-west NSW and north-west Victoria would likely result in the curtailment of renewable energy projects and increase network losses in the Broken Hill region.

AGL has recognised that the provision of an up to 100 MWh grid firming BESS would provide greater network stability in the Broken Hill region, and potentially reduce curtailment risk and spilt energy at nearby wind and solar farms. The Project would help support the existing transmission network and support the broader region. The Project would also align with key strategic energy policy for NSW, including the NSW Government's *Transmission Infrastructure Strategy 2018*.

The need for the Project and suitability of the Project Area is further detailed in **Chapter 3.0 Project development and alternatives**. Further detail on the alignment of the project with strategic planning objectives and statutory requirements is provided in **Chapter 5.0 Strategic and statutory context**.

An overview of stakeholder and community consultation, and where comments have been addressed in the EIS is provided in **Chapter 6.0 Consultation** (refer to **Table 6-2** and **Table 6-3**). Overall the community and stakeholders remain supportive of the Project. AGL will continue to consult with the community and key stakeholders about the Project and will address any questions or issues as they arise.

This EIS provides a comprehensive and appropriate assessment of the Project and its relevant environmental, social and economic issues, both alone and cumulatively. Potential impacts have been assessed and strategies to avoid, minimise and mitigate those impacts form a key part of the Project. This EIS includes a number of commitments to manage environmental impacts during the Project (refer to **Chapter 18.0 Management and mitigation measures**). Provided the management and mitigation measures are implemented and remain effective, there would be no likely residual adverse impacts for the following aspects given the existing environment:

- Aboriginal heritage
- Non-Aboriginal heritage
- Bushfire
- Hazards and risks
- Other matters (Landscape and visual, social and economic, waste, air quality).

For the remaining aspects (biodiversity, soil, groundwater and contamination, noise and vibration, transport and access, surface water, flooding and water use), further investigations have been undertaken as the Project could generate residual adverse impacts (albeit non-significant impacts). With the implementation of the management and mitigation measures in **Chapter 18.0 Management and mitigation measures**, these impacts would be manageable and not significant. Furthermore, given the nature of the potential impacts of the Project, the potential for cumulative impacts with other projects is considered to be negligible.

Overall, this EIS has concluded that the Project should proceed as it would:

- Be located in close proximity to key power utility infrastructure and identified future growth zones with regards to investment in renewable energy infrastructure. In this location, the Project would deliver critical energy infrastructure that would support the uptake of renewable generation in NSW, to help meet the objectives of the NSW Government's Electricity Strategy for the region
- Be located on a site that when compared to other options, presents environmental impacts that are equal to or less than other available options in the surrounding area
- Be located on a site which is on and surrounded by land which is zoned IN1 General Industrial, meaning that the Project would be compatible with the existing land uses during construction and operation

- Provide adequate separation from sensitive receivers
- Provide for the advantageous, orderly and economic use of land in a landscape that has a history of power generation and transmission alongside various rural and industrial land uses.
- Meet the objectives of the Project
- Satisfy the principles of ESD as described in the EP&A Regulation.

For these reasons, the benefits of the Project would outweigh the potential impacts and the Project is considered to be in the public interest. Based on the findings detailed within this EIS, the Project is considered to be justified and is recommended to proceed subject to consent.

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