AGL Energy Limited

30-Jul-2021

Broken Hill Battery Energy Storage System Project

Submissions Report

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Client: AGL Energy Limited

ABN: 74 115 061 375

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

30-Jul-2021

Job No.: 60619153

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1.0 Introduction

1.1 Background

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 Commons. The Site and the transmission line corridor constitute the 'Project Area' (refer to **Figure 1-2**).

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, an Environmental Impact Statement (EIS) (AECOM, 2021) was prepared in accordance with the relevant provisions of the EP&A Act. The EIS was placed on public exhibition in accordance with the requirements of the EP&A Act. During the exhibition period community members and stakeholders had the opportunity to submit feedback to the Department of Planning, Industry and Environment (DPIE). The purpose of this Submission Report is to respond to the relevant comments made in the submissions received during this exhibition period.

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

A community and stakeholder engagement plan (CSEP) developed by AGL for the Project. AGL's consultation objectives for the Project are discussed further in **Chapter 3.0 Consultation**.

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 guided the assessment of alternatives discussed in Section 3.3 of the EIS (AECOM, 2021).

1.3 Proponent details

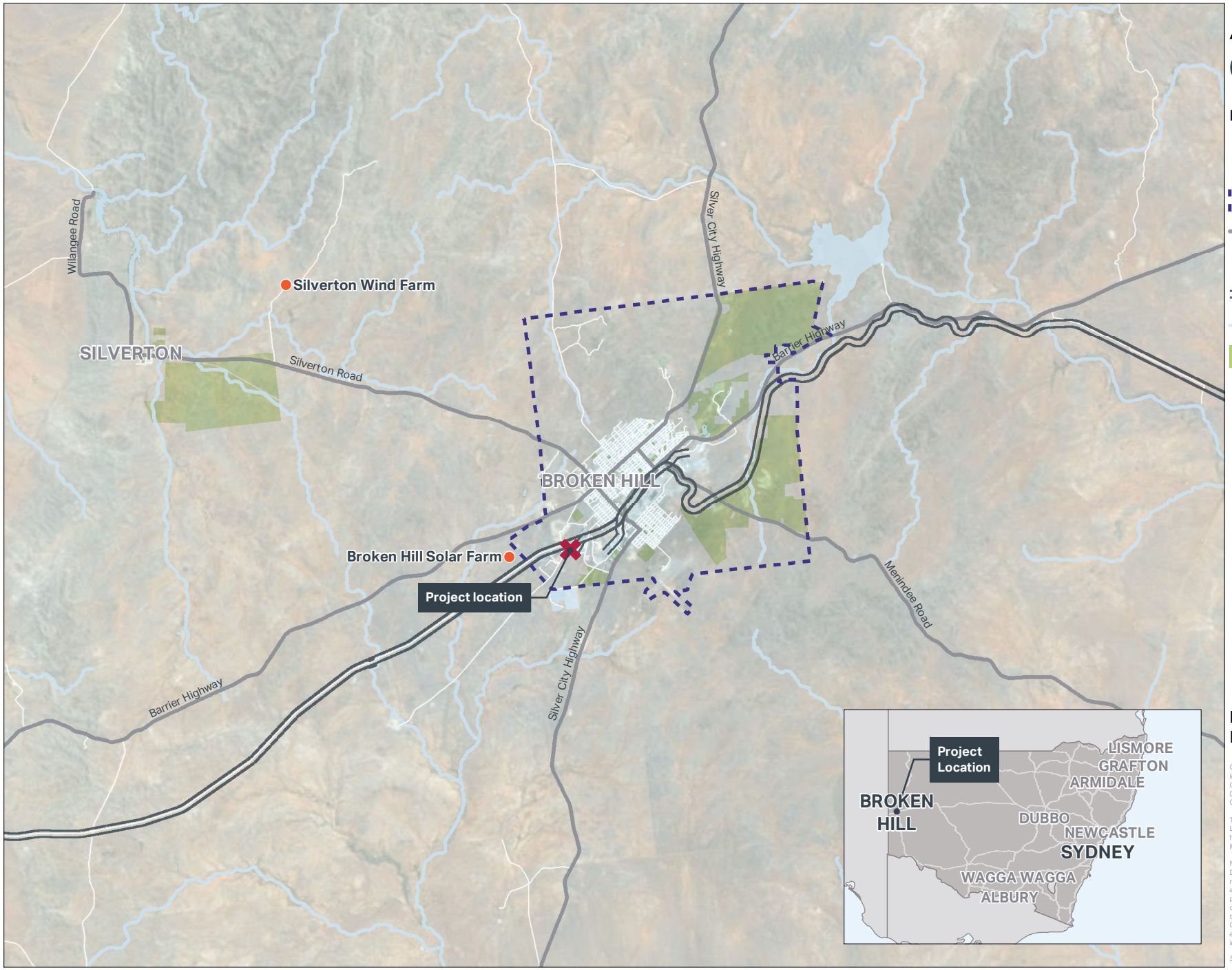
AGL operates base load, peaking and intermediate electricity generation plants supplying energy using traditional thermal generation as well as renewable sources including hydro, wind and solar. AGL employs over 8,300 people across Australia. Within New South Wales, AGL employs over 4,000 people.

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.

The details of the Proponent are provided in **Table 1-1**.

Table 1-1 Proponent details

Name	AGL Energy Limited
Postal address	Level 24, 200 George Street, Sydney NSW, 2000
ABN	74 115 061 375



AECOM

N

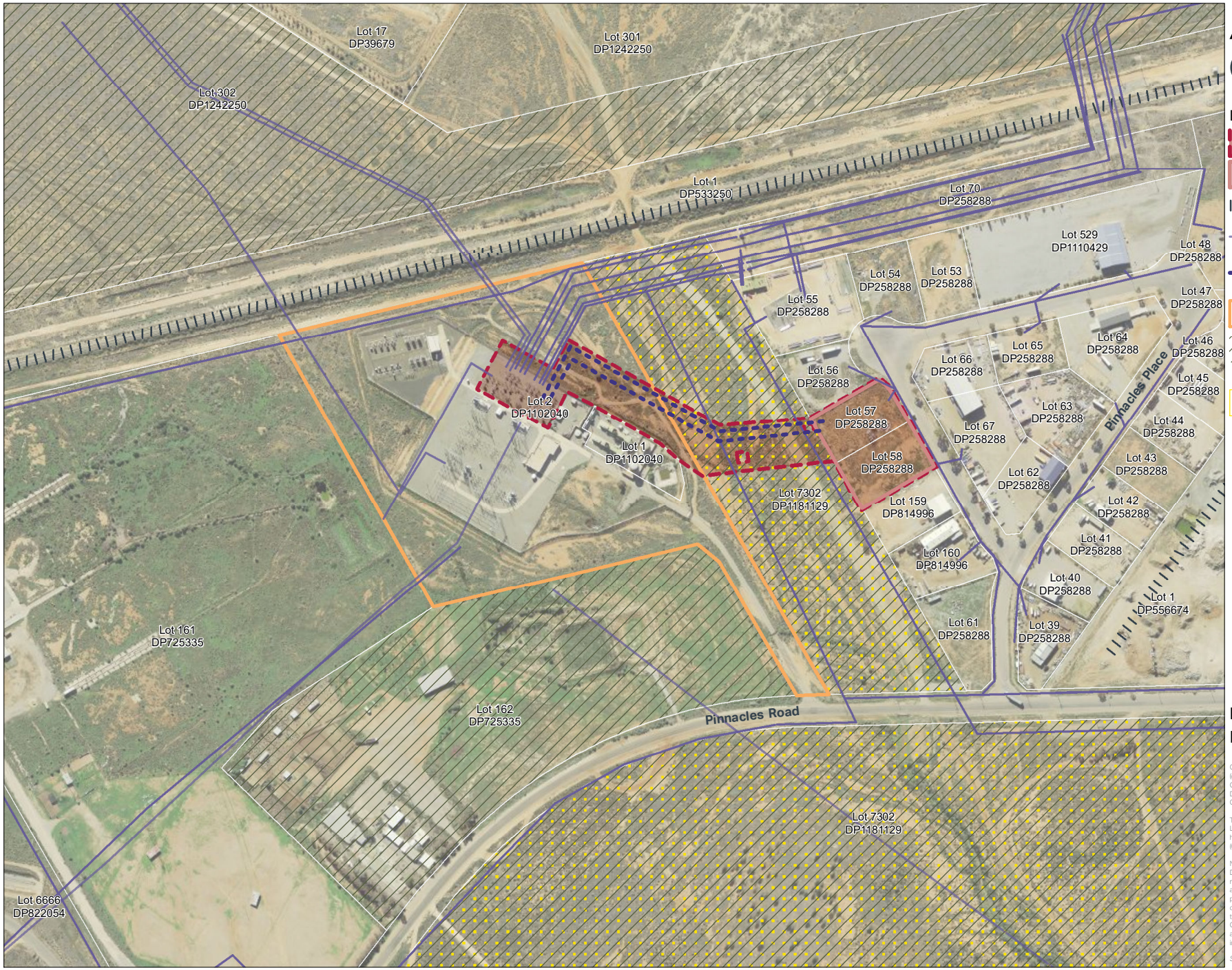
0 3 6 km

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

2.0 The Project

2.1 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 2-1**. These features comprise the proposed development for which development consent is sought under this State Significant Development Application (SSDA).

The full Project Description can be found in chapter 4 of the EIS (AECOM, 2021). There have been no changes to the Project for which approval is being sought since the exhibition of the EIS.

Table 2-1 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 2-1.**
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. A list of indicative plant and equipment is provided in chapter 4 of the EIS (AECOM, 2021).
Construction duration	Construction of the Project is intended to commence late 2021 and take approximately 12 months to complete.

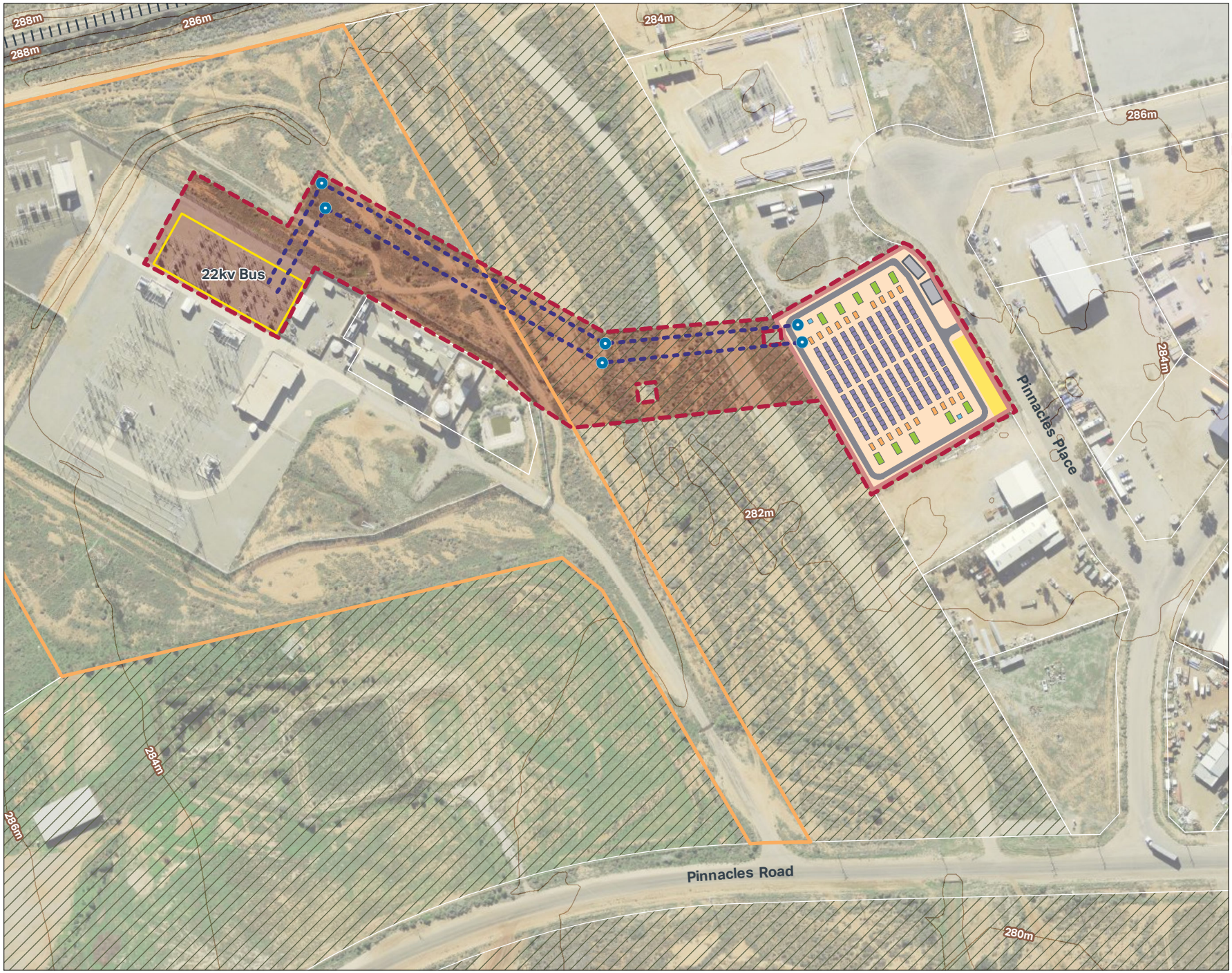
Project - Broken Hill Battery Energy Storage System (BESS)	
Construction workforce	Up to 50 construction workers (at peak) would be required. These workers would be preferentially sourced locally where appropriate skill sets are economically available.
Construction hours	The construction activities would 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.
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.

2.2 Construction program

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

Table 2-2 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



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 2-1:
PROJECT AREA LAYOUT

Source: © Department of Customer Service 2020

3.0 Consultation

3.1 Consultation objectives

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

1. Communicate and engage with community members at an early stage to ensure the community feel meaningfully included during the feasibility, planning and development phase.
2. Inform the local community and stakeholders of upcoming milestones or key decision points, demonstrating 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 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).

Consultation undertaken during the early planning phases, EIS scoping and EIS preparation with government agencies, non-government stakeholders and the community is summarised in chapter 6 of the EIS (AECOM, 2021).

3.2 Consultation during Exhibition

AGL has continued to engage with government agencies, non-government stakeholders and the community during the EIS exhibition period. This consultation is summarised in this section.

Furthermore, during the EIS exhibition period, DPIE consulted with key stakeholders to obtain their views of the Project and the EIS. The outcomes of this consultation is discussed in **Chapter 4.0 Summary of Submissions**.

3.2.1 Government agencies and non-government stakeholders

A summary of the consultation with government agencies and non-government stakeholders is presented in **Table 3-1**. The table includes relevant proposed actions and/or responses to this consultation.

Table 3-1 Government Agencies and Non-Government Stakeholders consultation summary

Stakeholder	Method	Date	Response
Broken Hill Local Aboriginal Land Council (BHLALC)	Email	3 June 2021-ongoing	AGL advised of EIS display and Community Information Session for the Project. The response was positive and supportive of the Project. AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week. Ongoing engagement with the BHLALC regarding the endorsement of the Project by the BHLALC Board.
NSW Aboriginal Land Council	Email	1 June 2021	AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week. Ongoing engagement regarding the BHLALC Board endorsement of the Project and the undetermined aboriginal land claim.
Broken Hill City Council	Email	3 June 2021	AGL advised of EIS display and Community Information Session for the Project. The response was positive and supportive of the Project. AGL met with Council during the exhibition period to discuss the Project, Council was particularly interested in potential employment opportunities in the region. In addition, discussions were progressed regarding the arrangements for the construction licence and agreement for easement.
Barkandji Native Title Determinants	Email	21 June 2021	AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week.
Councillors Marion Brown, Dave Gallagher, Maureen Clark, Darriea Turley	Email	21 June 2021	AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week. The response was positive and supportive of the Project.
Federal Member for Parkes Mark Coulton	Email	21 June 2021	AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week.
State Member for Barwon Roy Butler	Email	21 June 2021	AGL provided an update about the Project and reminded stakeholders that the EIS was on public display for another week.
Department of Planning, Industry and Environment – Biodiversity	Meeting	20 July 2021	AGL met with DPIE – Biodiversity Conservation Division (BCD)[1] to discuss the proposed response to their submission (refer to **Section 5.1**). DPIE – BCD were largely comfortable with the

Stakeholder	Method	Date	Response
Conservation Division			approach to responding to the submission, and welcomed ongoing discussion on the matters raised.
Heritage NSW	Meeting	20 July 2021	AGL met with Heritage NSW to discuss the proposed response to their submission (refer to **Section 5.5**.). Heritage NSW were comfortable with the proposed response and sought a summary of how matters were to be addressed. This was provided to DPIE on 21 July 2021 to issue to Heritage NSW

[1] Now called Biodiversity, Conservation and Science Directorate

3.2.2 Community

A community information session was held between 9:00 am and 7:00 pm on Wednesday, 16 June 2021. The session was held in person at the Broken Hill Community Centre in order to maximise the potential attendance.

The session was facilitated by a professional consultation team, and provided an opportunity for the community and stakeholders to meet the project team, hear more about the Project directly from the project team, ask questions and provide feedback.

Limited feedback was provided directly by any attendees at the community information session, though contact details were disseminated for any attendees to provide further input at a later date. Despite this, no additional consultation feedback was received. A summary of the matters raised by registered participants has been summarised in **Table 3-2**.

Table 3-2 Matters raised during community open day

Matter for consideration	Response
Impact to Commons parcel	AGL is working in close consultation with registered Aboriginal parties to ensure that the work in the Commons parcel is effectively managed.
Stimulus of local employment during construction	AGL has committed to working together with the business community to, where possible and where skillset is available, hire local talent to work on the Project.
Consultation with registered Aboriginal parties	AGL has been in regular contact with the Broken Hill Local Aboriginal Land Council and Barkandji Native Title Determinants.

A summary of the other consultation with the community is presented in **Table 3-3**, including the proposed action and or response to this consultation.

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

Stakeholder	Method	Date	Response
Nearby neighbour (Lot 6806 DP 823918)	Email	16 June 2021	Positive and supportive of the Project. AGL advised of EIS display and Community Information Session for the Project.
Nearby neighbour – 62 Pinnacles Place Farwest Mills and Solar	Phone	18 June 2021	Positive and supportive of the Project. Provided an update about the Project and advised of EIS display period.
Nearby neighbour – 67 Pinnacles Place, Consolidated Fabrication and Engineering	Phone	18 June 2021	Positive and supportive of the Project. Provided an update about the Project and advised of EIS display period.
Nearby neighbour – 86 Pinnacles Place, Broken Hill Freight Centre	Phone	18 June 2021	Positive and supportive of the Project. Provided an update about the Project and advised of EIS display period.
Nearby neighbour – 82 – 84 Pinnacles Place	Phone	18 June 2021	Positive and supportive of the Project. Provided an update about the Project and advised of EIS display period.
Broken Hill Freight Centre	Email	21 June 2021	Provided an update about the Project and reminded stakeholders that the EIS was on public display for another week.

3.3 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 aim to 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.

4.0 Summary of submissions

An overview of the submissions made during the EIS exhibition period is provided in **Table 4-1**. Copies of the full submissions can be viewed or downloaded from the NSW Major Projects website[1].

The following organisations provided submissions:

- DPIE – BCD[2]
- Broken Hill City Council
- DPIE – Water
- Department of Premier and Cabinet (DPC) – Heritage NSW
- Department of Regional NSW – Mining, Exploration and Geoscience
- NSW Rural Fire Service
- Transport for NSW
- Australia Rail Track Corporation (ARTC)
- DPIE - Crown Lands

One submission outlining support of the Project was also provided by a community member.

Table 4-1 Overview of submissions received

Position	Number of submissions from government agencies and other organisations	Number of submissions from community members	Total
Support	0	1	1
Comment	9	0	9
Object	0	0	0
Total			10

No form letters or petitions were received.

[1] https://www.planningportal.nsw.gov.au/major-projects/project/40686
[2] Now called Biodiversity, Conservation and Science Directorate

5.0 Response to submissions

This section provides verbatim text from the original submission as well as a response to those submissions.

Responses in this section are restricted to agencies and organisations as the community submission was a comment only, supporting the Project.

5.1 Department of Planning, Industry and Environment: Biodiversity Conservation Division

Submission	Response
Issue 1. The qualitative flood risk assessment does not meet DPIE requirements	
BCD has reviewed the flooding component in Section 14.0 of the EIA (and Appendix G). DPIE has noted that the EIS does not fully address the Secretary's requirements for flooding. The EIS (Chapter 14.0 – Surface water, flooding and water use & Appendix G – Surface water assessment) also does not address the BCD environmental assessment required related to flooding. A simple hydrological assessment has been completed that examines the overland flow-related flooding that would occur during high intensity rainfall events originating within the industrial subdivision. However, no assessment seems to have been undertaken of the flows residing in the adjacent ephemeral flow path (that runs adjacent to the site). It is possible that any overland flow event could coincide with a flow emanating in this ephemeral flow path due to the relatively small upstream catchment, which may impact the site. The flood liability of the proposed development site remains unknown until the flows from these catchments are hydraulically modelled to determine the extent, depths and velocities of the design flood events. Note that this additional modelling does not have to encompass a complex fully 2-D hydraulic model. It could be a simple 1-D approach that includes the major drainage lines, most crucially the ephemeral drainage line, that allows for the mapping of the major design flood events. It will also allow for the flood liability of the site to be determined and the impacts resulting from the development (internal and external to the site) to be determined.	A one-dimensional (1D) hydraulic model has been developed to assess the flood extents, depths and levels along the ephemeral drainage line. This has been undertaken to determine whether the Site would be impacted by floodwaters along the ephemeral drainage line in a 1% AEP storm event. The adopted modelling approach and modelled results are provided in **Appendix A**. The modelling results indicated that the Site would not be impacted by flooding along the ephemeral drainage line in a 1% AEP event. The Site can achieve at least 0.40 m freeboard to the 1% AEP flood levels, based on existing surface levels along the western boundary of the Site. A larger amount of freeboard would be achieved at higher levels within the Site and for important infrastructure set above the existing ground level. On this basis, surface water runoff generated by the Site would be able to freely drain to the ephemeral drainage line, noting that the timing of peak discharge from the Site would not coincide with the timing of peak flows along the ephemeral drainage line. Therefore, when peak flows discharge from the Site, water surface levels within the ephemeral drainage line would be significantly lower. A sensitivity analysis, allowing for culvert blockage, increased flows and increased tailwater conditions, has also been undertaken. Under these more extreme/conservative conditions, the Site would still not be impacted by the 1% AEP floodwaters moving along the ephemeral drainage line.

Submission	Response
Recommended action: Complete quantitative flood modelling and assessments of the overland flow and ephemeral drainage lines to determine the flood liability of the site from all contributing catchments for appropriate design storm events.	Two contributing catchments are relevant for the Project: the large ephemeral drainage line catchment to the west of the Site (discussed above); and the local industrial catchment to the east. An assessment of floodwaters generated by the local industrial catchment was undertaken as part of the EIS. This assessment determined that the Site would not be impacted by floodwaters generated by this local industrial catchment. On this basis, the Site would not be impacted by floodwaters from the contributing catchments (i.e. from both the large ephemeral drainage line catchment as well as the local industrial catchment). Therefore, the Site would be protected from flooding (due to external flows) in all events up to and including a 1% AEP event. The Site would also not obstruct existing flood flow paths nor would it impact existing flood conditions. Management of flooding at the Site would consist of managing surface runoff generated by the Site itself and limiting discharge as outlined in the EIS. Based on the above findings, the statement included in the EIS – that floodwaters moving along the ephemeral drainage line could be contained within the 120 m wide Commons – remains valid.
Issue 2. The BDAR needs more detail to meet BAM minimum requirements	
DPIE has confirmed that the Biodiversity Assessment Method (BAM) 2017 can be applied to the project, rather than BAM 2020. BAM 2020 came into force in October 2020. The SEARs were issued in December 2020, and BCD advice to Planning and Assessment refers to BAM 2020. However, a transitional period is in place to enable Biodiversity Assessment Reports (BARs) for state significant development/ infrastructure project to be prepared using BAM 2017 until 22 October 2021. BCD acknowledges that the proposed site of the BESS on Lots 57 and 58 appears to be highly disturbed. However, the adjoining Crown land appears on aerial imagery to be more intact and includes a non-perennial stream. Further justification is needed for several aspects of the assessment to demonstrate application of the BAM and meet the minimum requirements specified in BAM Appendix 10.	The disturbance area for the Project was outlined within section 1.2 and 1.2.1 of the Biodiversity Development Assessment Report (BDAR) (Niche, 2021). To assist with the understanding of this section, additional mapping has been provided in Appendix B of this Submissions Report. Figure 1 through to Figure 5 in Appendix B include a defined 'development footprint', which shows that this area sits within the broader Project Area. Figure 1 in **Appendix B** (as well as **Figure 2-1**) also shows that the laydown area (including laydown of equipment) would be placed wholly within the development footprint and therefore, have been assessed for direct impact. The 20 m wide corridor is also part of the development footprint which would accommodate the proposed transmission line, poles and access tracks. This part of the development footprint is an overestimation of the required clearing for

Submission	Response
Specific comments on the BDAR and related sections in the EIS are as follows. *The development footprint must be clearly identified and mapped* The development footprint (area of direct impact) within the subject land has not been mapped in the BDAR. Section 1.2.1 (page 3) describes the footprint. The BESS site on Lots 57 and 58, DP 258288, is mapped and the rest of the footprint could be inferred from the Australian Bustard species polygon, however it is not clearly shown on maps or included with the spatial data. Table 15 (page 27) includes a mitigation measure to establish a clearing exclusion zone and mentions laydown of equipment. All vehicle movements and laydown areas should be within the assessed area for direct impact. **Recommended actions:** • Provide a map and spatial data for the assessed development footprint • Ensure all ancillary activities and infrastructure, such as vehicle tracks, security fencing and material lay-down areas, have been included in the assessed development footprint.	the installation of this transmission line, as all vegetation is low-lying and only the pole locations and areas for access would be cleared. There are multiple existing access tracks along the transmission line corridor, which is evident on the satellite imagery, which would be used, where possible, to avoid clearing areas within the transmission line corridor that contain vegetation. Mitigation measure ID B1 includes a commitment to establish an exclusion zone (non-intrusive, no clearing required) around the area of moderate condition PCT 155. No other exclusion zones are proposed during construction of the proposed transmission line in the transmission line corridor.
Information about assessed vegetation zones is missing from the BDAR. The native vegetation assessment results in Table 7 (page 15) are limited to the development footprint. The BDAR should include a table summarising all native vegetation mapped on the subject land ('project area' in the BDAR) indicating the required number of plots. The survey effort and intent of the plot-based vegetation survey is to identify the PCTs (BAM 2017, cl. 5.2.1.4). The plot based survey must be stratified and targeted to assess the expected environmental variation (BAM 2017, cl. 5.2.1.7), which means both the mapped condition states for PCT 155 should be adequately sampled. The data for PCT 155 mapped as 'moderate' condition should be included in the BDAR and BAM-C. Vegetation zones in BAM-C and the BDAR should match the spatial data for zones clipped to the subject land boundary (datasets dated 2020 May 2021).	There is a single native vegetation zone that would be impacted by clearing, which is described within the BDAR (refer to section 4.2), with other vegetation zones added to the figure for context (refer to Figure 3 in **Appendix B**). The development footprint was refined following survey work, with consideration to avoidance of impacts, which is why some plots are outside the development footprint. Data from plots representing zones that are not within the development footprint cannot be added to the BAM-C due to the requirement for an area of clearing to be nominated which is not appropriate for areas that will not be cleared. A single plot (Plot 3) was conducted within the development footprint. No updates have been made to Table 7, as only PCT 155 low condition is proposed to be affected (i.e. this PCT is within the development footprint). BAM plot numbers have been added to Figure 3 (refer to **Appendix B**). BAM Plot data for plots 1 to 4 were sent as an excel spreadsheet to DPIE on 15 June 2021.

<table>
<tr><th>Submission</th><th>Response</th></tr>
<tr><td>
<table>
<tr><th>GIS label</th><th>PCT ID</th><th>Area (ha)</th></tr>
<tr><td>Bluebush shrubland – low condition</td><td>155</td><td>2.63</td></tr>
<tr><td>Bluebush shrubland – moderate condition</td><td>155</td><td>0.06</td></tr>
<tr><td>Exotic</td><td>0</td><td>0.54</td></tr>
</table>
While it is not critical for DPIE’s review of a simple development site such as this, the BDAR and spatial data should include the BAM-C vegetation zone identified to enable cross-checking (e.g. Zone 1).
Recommended action:
• Table 7 to include the area vegetation zone in the project area (mapped in Figure 3).
</td><td></td></tr>
<tr><td>
More evidence is needed to justify use of BAM Plot 3 to represent the assessed vegetation zone #1 (PCT 155 low condition).
The area around BAM Plot 3 does not appear to be representative of the vegetation to be impacted by the transmission connection on the adjacent Crown land (Lot 7302, DP1181129).
BAM plot numbers should be included on the vegetation zones map for cross-checking.
The Broken Hill aerial imagery available to BCD was captured in 2013 (figure A.1). Aerial imagery from 2021 available on Google Maps has also been reviewed (figure A.2) and shows the difference in vegetation pattern between Lots 57 and 58 and the Crown land traversed by the proposed transmission line (particularly within the blue line).
Recommended actions:
• BAM plot numbers to be included on Figure 3 (matching plot numbers in Annex 2 and spatial data).
</td><td>
A total of four plots were undertaken during surveys for the BDAR (Niche, 2021). Data from one of these plots (Plot 3), which is within the Site, was added to the BAM-calculator as this was considered the most representative of areas impacted by vegetation clearing.
Given the disturbed nature of the disturbance footprint, which is evident from supplied aerial photography (Figure 1 in Appendix B), it is considered that this plot (which was used for condition scoring) was located conservatively. It was considered conservatively located as it was located within an area that allowed for the full length of the plot to be accommodated without cleared tracks intervening.
The plots undertaken as part of the BDAR are consistent with the BAM requirement. All plot data are provided within Annex 1 of the BDAR (Niche, 2021). When other plot data for low condition areas are considered and compared with the selected plot, it is evident that the selected plot is representative. Plot 3 was chosen as it is within the development footprint. Other plots (Plots 1, 2 and 4) were not located within the development footprint.
</td></tr>
</table>

Submission	Response
• Provide more evidence to justify use of BAM Plot 3 to represent the assessed vegetation zone #1 (PCT low condition).	The development footprint was refined following survey work, with consideration to avoidance of impacts, which is why some plots are outside the development footprint. **Figure 3** (refer to **Appendix B**) showing the vegetation zones has been updated to include plot numbers as per Annex 2.
Justification is needed for exclusion of species credit species from the assessment. *Swainsona murrayana* was surveyed outside the specified survey months. The survey guidelines for threatened species described circumstances when the required survey season for threatened plant survey may be adjusted. However, any alteration to survey timing must be agreed with DPIE before the BDAR is submitted. An opportunistic fauna survey as described in Section 3.2.2 and Table 12 (page 22) is inadequate for demonstrating presence or absence of species credit species. Crowned Gecko (*Lucasium stenodactylum*) does not have a specified habitat constraints in BioNet. Further justification is needed for excluding this species from the assessment, according to BAM s.6.4 Steps 3 and 4, including description of habitat requirements and evidence from the field assessment that these components of the vegetation are degraded. **Recommended actions** Provide further justification for removal of Crowned Gecko and *Swainsona murrayana* from the assessment. Revise offset requirements in Section 5 (page 31) based on any resulting changes to the BAM calculator case.	*Swainsona murrayana* A survey was conducted in October 2020 to determine the presence of *Swainsona murrayana* (Slender Darling-pea) within the Project Area. A single survey month for the species is provided within the BAM-C (September). However, this does not appear to reflect the species profile, which states that plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. A review of current information in NSW for this species (NSW Scientific Committee 2008) states that the flowering period of *Swainsona murrayana* is from August to November. Furthermore, this document contains location and record data, with 13 sites detecting the species in October (between 1956 and 2001). One of these sites recorded 3000 plants in October 2000. The BDAR (Niche, 2021) provided a justification for the suitability of the survey period, which included: • Survey outside specified months; however, the species is known to flower in spring to early summer. • Low – marginal habitat is present within better condition areas of the study area only, which have been avoided through Project design/site selection. This species was not detected during targeted searches in October 2020. • The closest record of *Swainsona murrayana* is from Silverton (approximately 23 km to the north-west) from 1947. • The approved conservation advice for the species states: Slender Darling-pea is found in grassland, herbland, and open Black-box woodland, often in depressions (DSE, 2001; Harden, 2002; DECC,

Submission	Response
	2005a). This species grows in heavy grey or brown clay, loam, or red cracking clays (DSE, 2001; DECC, 2005a). The Project Area does not conform well with this description given the lack of grassland, herbland or Black Box Woodland. The Project Area does not support heavy clay, loam or red cracking clays being predominantly shrubland on soils with a higher sand content. As such, offset requirements for *Swainsona murrayana* have not been revised in the BAM calculator case. Niche acknowledge that the alteration of the survey timing should have been agreed to prior to submission of the BDAR. *Lucasium stenodactylum* The development footprint is mapped, using BioNet, as an area where the Crowned Gecko (*Lucasium stenodactylum*) is predicted to occur (not known to occur). The closest records for the Crowned Gecko are over 100 km from the development footprint. Prior to 2007 it was known as *Diplodactylus stenodactylus*. The species is known from Sturt National Park, Mutawintji National Park and Thurloo Downs. Their habitat is not well known but it has been found in red and sandy soil habitats, as well as savannah woodlands and shrubby stony areas (NSW Scientific Committee 2004). The development footprint is degraded and considered unsuitable for the Crowned Gecko due to the presence of European Rabbits and previous clearing, which has caused a reduction in the density of shrubs and ground cover which are required to provide shelter habitat. A reduction in shrub and ground cover also increases the risk of predation from cats and foxes. Given the multiple threats present, the degraded condition of the development footprint, and the lack of nearby records, it is considered unlikely that the development footprint would qualify as habitat for the species. For these reasons, targeted searches for this species were not considered to be required. Furthermore, offset requirements have not been revised in the BAM calculator case.

Submission	Response
Issue 3. Specify avoidance and mitigation measures	
Avoidance and mitigation measures require specific information for BCD to be confident that the assessment will achieve the 'avoid and minimise' principles of the Biodiversity Offset Scheme. The BAM Stage 2 Operational Manual (Section 2.6, page 20) describes the level of detail expected for these measures, including the requirement for spatial identification of avoided areas. Each measure should have a unique identifier to allow tracking through to management plans and compliance auditing. **Recommended actions:** • Include specific details for measures in Table 15 to ensure biodiversity impacts are avoided, minimised and mitigated.	Avoidance of impacts has been inherent in the development of the design of this Project. Biodiversity surveys were undertaken to inform site-selection, and then also used to refine the extent of the development footprint (i.e. the commitment to the avoidance of clearing PCT 155 medium condition). The development footprint would result in the limited clearing of low condition vegetation. Avoidance and mitigation measures are provided within section 4.1 of the BDAR (Niche, 2021). Table 15 of the BDAR mentions specific avoidance and mitigation measures, descriptions, and their timing and responsibility. These measures have been transposed into the management and mitigation measures for the Project (refer to **Chapter 6.0 Management and mitigation**). These management and mitigation measures include unique ID numbers. Management and mitigation measure ID B1 includes the commitment to prepare a Biodiversity Management Plan (BMP) prior to the commencement of construction activities. This includes a commitment to establish an exclusion zone around PCT 155 Moderate condition adjacent to the development footprint to ensure it is not disturbed.

5.2 Broken Hill City Council

Submission	Response
Broken Hill City Council (Council) provided DPIE with a submission on the Project during exhibition. Council noted that they have liaised with AGL throughout the process and are satisfied that the EIS adequately addresses all relevant planning issues. In addition, Council stated that the Project is a low impact industrial use in an industrial area, and as such they are satisfied that the Project will not result in any major detrimental impact to the local amenity. Council believe the Project is positive for Broken Hill and have no objection or concerns at this stage.	Noted.

5.3 Crown Lands

Submission	Response
Crown Lands has no comments for this Project. Crown Lands notes that Broken Hill City Council is responsible for the Crown land known as Lot 7302 DP1181129, where an easement is proposed, so they should be consulted regarding this Project.	Section 4.2.3 of the EIS states that an above-ground 22 kV transmission line from the Site to the TransGrid Broken Hill Substation would be constructed (as shown in **Figure 2-1**). This construction would involve crossing Lot 7302 DP1181129, which has been identified as being a portion of the Willyama Commons (discussed in section 5.3.8 of the EIS). This land is also subject to an undetermined Aboriginal Land Claim #40469. Throughout the preparation of the EIS, AGL consulted with Broken Hill Local Aboriginal Land Council (BHLALC), NSW Aboriginal Land Council (NSWALC) and Broken Hill City Council (being the executor of the Willyama Commons Trust). These consultation activities are summarised in Chapter 6 of the EIS (AECOM, 2021). Following the exhibition of the EIS, AGL has further consulted with Broken Hill City Council, given a transmission line is proposed across Lot 7302 DP1181129, to ensure all requirements are addressed pursuant to the Willyama Commons Trust. Details regarding this ongoing consultation has been provided in **Section 3.2.1**. Consultation with Broken Hill City Council has and will continue to occur throughout the development of the Project.

5.4 Natural Resource and Access Regulator

Submission	Response
The following recommendation is provided by the Natural Resource Access Regulator (NRAR): • The proponent must prepare a Soil and Water Management Plan to address stormwater management and sediment and erosion control. The plan is to address the requirements of the guideline Managing Urban Stormwater: Soils and Construction (Landcom 2004) and the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	Noted. It was proposed in section 11.5 of the EIS (AECOM, 2021) that a Soil and Water Management Plan (SWMP) be prepared in order to document and assist with the implementation of the measures required to manage potential erosion impacts related to the Project. The SWMP would address the requirements of the guideline Managing Urban Stormwater: Soils and Construction (Landcom 2004) and the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018). Details regarding the implementation of this management and mitigation measure has been provided in **Section 6.1** (specifically, management and mitigation measure ID C2). This mitigation measure has been updated to specifically refer to *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018).

5.5 Heritage NSW

Submission	Response
Heritage NSW has reviewed the available supporting documentation and provides comments for the proposed development in relation to Aboriginal cultural heritage regulation matters below. In preparing the following advice Heritage NSW reviewed the following documents: • Broken Hill Battery Energy Storage System Project, Environmental Impact Statement – prepared by AECOM Australia Pty Ltd (AECOM), dated May 2021. • Appendix A: Secretary's Environmental Assessment Requirements, issued 23 December 2020. • Appendix C: Broken Hill Battery Energy Storage System Project, Aboriginal Cultural Heritage Assessment Report – prepared by AECOM, dated May 2021.	As noted in section 6.0 of the Aboriginal Cultural Heritage Assessment Report (ACHAR), the Project Area is located within the semi-arid rangelands of far western NSW, an area dominated by extensive surface distributions of stone artefacts and heat retainer hearths. These features occur in a range of landscape contexts but are particularly prevalent on eroded land surfaces adjacent to creeks, drainage lines and swamps (refer to Holdaway & Fanning, 2014; Holdaway et al., 2000; Shiner, 2008; Witter, 2004). The area of proposed surface disturbance (the Project Area) is located approximately 75 m east of the headwaters of a 1st order ephemeral drainage line. This watercourse is barely perceptible in the landscape and would only rarely contain water following rain events. The extreme ephemeral nature of the watercourse suggests that land within the

Submission	Response
The Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared in reference to the relevant guidelines as required by the SEARs. It is noted that there are no registered Aboriginal sites, areas of Potential Archaeological Deposit (PAD), and Aboriginal Places located within the proposed development area. The archaeological survey was conducted as per the *Code of Practice Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). Heritage NSW advises that while adequate in addressing the SEARs, further explication is required in the ACHAR. The ACHAR states that much of the project area has been subject to clearance and grading. However, there is little discussion of the resultant impacts to potential sub-surface deposit, not the potential depth of archaeological deposits within the region. Heritage NSW agrees with the current Management Recommendation ACHAR outcomes, based on the current state of the archaeological investigation. The EIS (Section 9.5) states that an Aboriginal Cultural Heritage Management Plan (ACHMP) would form part of the Construction Environmental Management Plan (CEMP). Conditions for the creation and implementation of an ACHMP are provided in Attachment A.	Project Area is of low archaeological sensitivity. While Aboriginal people may have passed through the Project Area in the past, it is considered highly unlikely that the area would have contained appropriate resources for short or long term occupation by Aboriginal people. This is supported by a review of AHIMS data obtained for the ACHAR, and the results of the assessment itself, which failed to identify any Aboriginal objects within the Project Area. As noted above, the Aboriginal archaeological sites with the semi-arid rangelands of far western NSW are dominated by surface sites. Holdaway et al. (2014) in particular has noted that the stone artefact record of semi-arid rangelands "*most often comprises surface deposits of stone artefacts commonly, but not always, associated with other archaeological remains…*". These sites usually represent multiple behavioural events, aggregated into a single surface expression. Fanning (2002) argues that the primary cause for stone artefacts to be present in surface contexts is due to erosion which has been accelerated by land use change related to European grazing activities. However, subsurface materials occur in semi-arid landscapes, but only when the environment favours deposition, such as on channel margins on valley floors (Holdaway et al., 1997). Reference to the topography of the Project Area and surrounds, as discussed in section 4.2 of the ACHAR (AECOM, 2021), indicates that it comprises an area of level to very gently inclined slope and does not form part of what would be considered a depositional environment. As such, archaeological deposits would not be anticipated within the Project Area. While few programs of archaeological test excavation have been completed in the Broken Hill area, a recent assessment completed by Niche (2017) is informative. Niche (2017) completed a program of archaeological test excavations between Broken Hill and Pine Creek, including along Stephens Creek. The program of test excavation found that soils within tested landforms rarely exceeded 300 mm in depth, with no deep A horizon soil profiles encountered. Furthermore, no Aboriginal objects were recovered from below 50 mm.

Submission	Response
	Soils were found to often be windblown, disturbed and reworked, supporting the interpretation that most surface finds were lag deposits and the integrity of any subsurface Aboriginal objects present in this landscape is likely to be poor. As noted in section 4.7 of the ACHAR (AECOM, 2021), the Project Area has been subject to multiple historical activities and ground surface activities. These have included: • Complete vegetation clearance across the entire Project Area prior to 1982 • Commencement of construction of the substation station at Lot 2 DP1102040 in 1982 • Grading for various access tracks in and around the Project Area prior to 1982 • Road constructed through the land classified as Commons prior to 2004 • Vegetation clearance and grading across Lots 57 and 58 DP258288 (the Site) in 2010 • Vegetation clearance and further grading in part of Lot 58 DP258288 as well as grading within the land classified as Commons in 2015. To varying degrees, all of the above-cited land use activities and associated ground impacts are relevant to the survival, integrity and identification of Aboriginal archaeological evidence within the Project Area. In particular, grading within the Site is likely to have not only impacted any surface Aboriginal objects but, in the unlikely event that it was present, subsurface archaeological deposit. Consideration of all the factors outlined above indicates that there is a low likelihood for subsurface deposits to be present within the Project Area.

Submission	Response
	Finally, it is noted that while not an archaeological consideration, during discussions regarding the archaeological sensitivity of the Project Area with Registered Aboriginal Parties (RAPs) participating in the survey, RAPs suggested that land within the Project Area was highly disturbed and of low archaeological sensitivity.

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

Submission	Response
A response was received from the NSW Department of Regional NSW – Mining, Exploration and Geoscience (MEG) – Geological Survey of NSW (GNSW). MEG has reviewed the EIS for the Project and makes the following comment: • The proponent states retirement of ecosystem and species credits are required to offset the residual impacts of the Project. We request to be consulted in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.	Noted. The retirement of these credits (ecosystem and species) can be made through either onsite offsets, offsite offsets, or payment to the Biodiversity Conservation Trust (BCT). Given the extent of development of the Project Area, retirement of credits through onsite offsetting is considered unlikely. As such, it is likely that the credit liability for the Project would be resolved through either or a combination of offsite offsetting and/or payment into the BCT. In the event offsite offsetting is considered the preferable mechanism to resolve the credit liability for the Project, further consultation would be undertaken with MEG GNSW as part of the preparation of a Biodiversity Stewardship Assessment Report (BSAR). This commitment has been included as an additional management and mitigation measured (ID B5) in **Section 6.1**.

5.7 NSW Rural Fire Service

Submission	Response
The NSW Rural Fire Service (NSW RFS) has reviewed the EIS and provides the following comments: 1. To the satisfaction of the hazard division of DPIE, a Fire Safety Study (FSS) is prepared consistently with the Hazardous Industry Planning and Assessment Papers (HIPAPs) detailing fire preservation and mitigation measures for all credible fire hazards (including grass and bushfires). 2. A Fire Management Plan (FMP) must be prepared in consultation with the NSW RFS Far West office located in Cobar. The FMP must include: a. 24-hour emergency contact details, including alternative telephone contact b. Site infrastructure plan c. Firefighting water supply d. Site access and internal road plan e. Implementation of Asset Protection Zones (APZ) and their continued maintenance f. Location of hazards (physical, chemical and electrical) that will impact on firefighting operations and procedures to manage identified hazards during firefighting operations. g. Such additional matters as required by the Far West office (FMP review and updates). 3. A minimum APZ setback of 10.5 metres must be provided between the western boundary of the site (Lot 57 & 58 DP258288) and the proposed BESS. 4. The entire 'Project area' must be managed in perpetuity in the standards of an inner protection zone (IPA) as outlined in Appendix 4 of *Planning for Bush Fire Protection 2019.* When establishing and maintaining an IPA, the following requirements apply: a. Tree canopy cover be less than 15% at maturity b. Trees at maturity are not touching or overhang the building c. Lower limbs are removed up to a height of 2m above the ground d. Tree canopies are separated by 2 to 5m.	Noted and AGL understands the intent is for these items to form conditions of consent. A number of these items are already captured in the mitigation measures outlined in **Section 6.1.1**, including the commitment to consulting with NSW RFS regarding the requirement to complete a Fire Safety Study.

Submission	Response
e. Preference is given to smooth-barked and evergreen trees f. Large discontinuities or gaps in vegetation are provided to slow down or break the progress of fire towards buildings g. Shrubs are not located under trees h. Shrubs do not form more than 10% of ground cover i. Clumps of shrubs are separated from exposed windows and doors by a distance of at least twice the height of the vegetation j. Grass to be kept mown (as a guide, grass should be kept to no more than 100mm in height) k. Leaves and vegetation debris are removed l. NSW RFS's document *Standards for asset protection zones*. 5. Any landscaping within the IPA must comply with Appendix 4 of *Planning for Bushfire Protection 2019*. In this regard, the following principles are to be incorporated: a. A minimum 1-metres wide area, suitable for pedestrian traffic, must be provided around the immediate curtilage of the building b. Planting is limited in the immediate vicinity of the building c. Planting does not provide a continuous canopy to the building (i.e. trees or shrubs are isolated or located in small clusters) d. Landscape species are chosen to ensure tree canopy cover is less than 15% (IPA) at maturity and trees do not touch or overhang buildings e. Avoid species with rough fibrous bank, or which retain/ shed bark in long strips or retain dead material in their canopies f. Use smooth bark species of trees species which generally do not spread fire up the bark into the crown g. Avoid planting of deciduous species that may increase fuel at surface/ ground level (i.e. leaf litter) h. Avoid climbing species to walls and pergolas i. Locate combustible materials such as woodchips/ mulch, flammable fuel stores away from the building j. Locate combustible structures such as garden sheds, pergolas and materials such as timber garden furniture away from the building k. Low flammability vegetation species are used.	

Submission	Response
6. The proposed BESS must be designed and constructed to withstand ember attack and radiant heat up to and including 12.5 kW/m^2 from a bushfire attack. 7. Any new Class 10b structures as defined per the *National Construction Code* must be non-combustible 8. The proposed 'Access Road' must comply with the following standards for property access roads under Table 7.4a of *Planning for Bush Fire Protection 2019*: a. Two-wheel drive, all weather roads b. The capacity of road surfaces is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes) c. Minimum 4m carriageway width d. Provide a loop around the BESS e. Have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay f. A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches g. Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress h. The minimum distance between inner and outer curves is 6m i. The cross fall is not more than 10 degrees j. Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. 9. The provision of water, electricity and gas must comply with Table 7.4a of *Planning for Bushfire Protection 2019*.	

5.8 Transport for NSW

Submission	Response
Transport for NSW (TfNSW) does not object to the Project subject to the following conditions being included in any consent issued in relation to the SSD application by the consent authority: • The large vehicle permitted to access the site is a 26m B-double heavy vehicles and is restricted to 20 heavy vehicle movements a day • All vehicles are to enter and exit the site in a forward direction. • Safe Intersection Sight Distance (SISD) requirements outlined in the Austroads Guide to Road Design Part 4A and relevant TfNSW supplements is to be provided and maintained in both directions at the intersection of the Barrier Highway and Creedon Street. For a 50km/h speed zone the minimum SISD is 97 metres. • Prior to the commencement of construction work for the BESS, 'Advance truck warning signs' (W5-22 size B) with distance plates (W8-5 Size B) underneath, located 250m from the intersection of Barrier Highway and Creedon Street on both approaches along the highway are to be installed. These are to be removed once construction has been completed. • Prior to the commencement of construction works a Traffic Management Plan (TMP) including Driver Code of Conduct is required to be submitted to and approved by TfNSW. The preparation of the TMP will require consultation with TfNSW, Broken Hill City Council[3], the principle contractor(s) and relevant stakeholders. The requirements of the TMP and Driver Code of Conduct are to cover the matters referred to within the TMP Annexure (refer to **Appendix A**). • The TMP is to be reviewed and updated in response to any changes in operating conditions. A copy of the TMP and Driver Code of Conduct is to be provided to contractors and employees as a part of the site induction and a copy is to be made available to TfNSW with each major update.	A Traffic and Access Impact Assessment (TAIA) was prepared for the Project, which was summarised in chapter 13.0 and provided as Appendix F (Traffic and Access Impact Assessment) of the EIS. *Large vehicles* The TAIA assumed up to 20 heavy vehicles being required per day during the construction period, which would equate to 40 movements (20 in each direction i.e., to and from). As detailed in section 5.2.4 of the TAIA, the traffic volumes for the nominated heavy haulage routes in 2022 without the Project are low (refer to Table 7 of the TAIA). The construction haulage routes are approved B-double routes and are, therefore, considered to be in appropriate condition to accommodate construction traffic for the Project. The TAIA concluded that given the traffic volumes associated with the Project are low, the Project is not anticipated to have a significant impact on the condition of the existing operation of the haulage routes. In light of the assessment provided in the TAIA, it is requested that the condition of consent being proposed by TfNSW to limit heavy vehicle movements be increased from 20 heavy vehicle movements per day, to 40 heavy vehicles movements per day in order to accommodate the proposed and assessed traffic impacts. Section 13.5 of the EIS summarised the management and mitigation measures relevant to traffic and access impacts for the Project; including the preparation of a Construction Traffic Management Plan (CTMP) (refer to **Section 6.2**, specifically ID T1). The preparation of the CTMP will be completed in consultation with TfNSW and Broken Hill City Council as required. All other conditions of consent proposed by TfNSW are considered suitable, and align with the outcomes of the TAIA.

[3] Note: The TfNSW submission referenced Bogan Shire Council, however we believe that they intended to reference Broken Hill City Council as the relevant local roads authority.

5.9 Australian Rail and Track Authority

Submission	Response
The Australian Rail and Track Authority (ARTC) advised that they have no objection to the proposed major project. However, they noted if there is a need for an aerial or underground electrical connection to the energy storage system that they will need to cross the ARTC rail corridor then the following would apply: • Further consultation with ARTC should occur if any works are in, or have the potential to effect the rail corridor. If construction will involve the use of cranes that could have the potential to affect the rail corridor, or involve any access onto ARTC land or air space. For these works, a Third Party Access application needs to be submitted to ARTC.	The Project Area is defined in section 2.2.1 of the EIS. The BESS is located on Lots 57 and 58 of DP258288 and these lots make up the Site. The transmission line would cross Lot 7302 DP1181129 and Lot 2 DP1102040 and connect the Site to the TransGrid Broken Hill Substation. Access to the Site for operation and construction would primarily be from Pinnacles Place. Access to the transmission line corridor would be from the Site or off Pinnacles Road on to Lot 7302 DP1181129 and Lot 2 DP1102040. It is not anticipated that any works have the potential to affect the rail corridor or its airspace. In the event access or work is required on land managed by ARTC, AGL would prepare a Third Party Access application to be submitted to ARTC prior to the commencement of a works.

6.0 Management and mitigation measures

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

- Management and mitigation measures (refer to **Section 6.1**)
- Construction Environmental Management Plans (CEMPs) and sub-plans (refer to **Section 6.2**)
- Operational environmental management plan or system (refer to **Section 6.3**).

6.1 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 6-1**. Where additions have been made to these mitigation measures as a result of the submissions received, they are shown in **bold**.

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

Note: ID HR1 has been updated to align with the latest legislation.

Table 6-1 Management and mitigation measures

ID	Management and mitigation measure	Timing
General		
G1	AGL would prepare and implement a CEMP and sub-plans for the Project, which include the measures outlined in this table, relevant conditions of consent and the relevant requirements of other approvals.	Construction
G2	AGL would appoint an Environmental Management Representative to monitor the implementation of all environmental management measures. The EMR would ensure that conditions of consent and management and mitigation measures are being met or effectively applied during construction and that the work is being carried out in accordance with the CEMP and other relevant requirements.	Construction
G3	Community engagement would be maintained throughout the construction of the Project. A specific email address, dedicated phone number and online forum would be set up to receive and address questions, comments and concerns from the community.	Construction
G4	Broken Hill City Council (as nominated by CASA) would be consulted regarding works within the Project Area utilising cranes.	Construction
Biodiversity		
B1	A Biodiversity Management Plan would be prepared and include the following measures: • Establish an exclusion zone around the area of PCT 155 in moderate condition, to ensure it would not be impacted by the Project • Establish an exclusion zone so that the transmission line poles would not be placed within 10 metres either side of the 1st order stream. No vegetation clearing should occur within the riparian corridor.	Construction

ID	Management and mitigation measure	Timing
	• Undertake staff training to communicate the importance of exclusion zones, erosion and sediment controls, unexpected species and finds procedures • Outline hygiene protocols to prevent the spread of weeds or pathogens between affected areas and unaffected areas • Outline weed control measures to manage the potential dispersal and establishment of weeds during construction in accordance with the *Biosecurity Act 2015* (Cth).	
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
B5	**Consultation would be undertaken with NSW Department of Regional NSW – Mining, Exploration and Geoscience as part of the preparation of a Biodiversity Stewardship Assessment Report (BSAR), if offsite offsetting is progressed as the mechanism to retire the Project's credit liability.**	**Construction**
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 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	Construction

ID	Management and mitigation measure	Timing
	would cease immediately and the standard procedures set out in the NSW Police Force Handbook (2014); and NSW Health Exhumation of Human Remains Policy (2013) would be followed.	
Non-Aboriginal heritage		
NAH1	The CEMP for the Project would include stop work procedures to manage activities in the unlikely event that intact archaeological relics or deposits are encountered.	Construction
Soils, groundwater and contamination		
C1	A Remedial Action Plan would be prepared in accordance with *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, **in line with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018).** A Soil and Water Management Plan (SWMP) would be included as part of the CEMP. This SWMP would include: • Measures to manage erosion and stormwater • Stockpile management procedures for segregating spoil and preventing cross-contamination of clean spoil (virgin excavated natural material or excavated natural material) with potentially contaminated soil • Measures for stockpiles and storage areas to be located near the upstream (eastern) end of the Site, to prevent any loose materials being washed away into the downstream drainage system • Procedures for handling and storing spoil, including potentially or known contaminated soil/fill in accordance with the POEO Act, and protocols for waste classification and tracking for off-site disposal • 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	Construction

ID	Management and mitigation measure	Timing
	classification in accordance with the NSW EPA (2014) *Waste Classification Guidelines*.	
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 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	Construction

ID	Management and mitigation measure	Timing
	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 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

ID	Management and mitigation measure	Timing
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 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	Operation

ID	Management and mitigation measure	Timing
	• 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 ***Work Health and Safety Act 2011*** **(NSW and Commonwealth) and the *Work Health and Safety Regulation 2017* (NSW),** ~~*Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), *AS 1940:*~~ *The Storage and handling of flammable and combustible liquids* ***guidance material 2020*** (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

ID	Management and mitigation measure	Timing
HR7	The register of commitments (Appendix 1 of Appendix J Preliminary Hazard Analysis) is integrated into the management for the Project. This includes integration of 36 individual commitments, including for the design, installation and maintenance of the BESS automatic shutdown system on exceedance of safe limits; installation of deflagration venting and fire protection inside the battery enclosures; design of the BESS such that the risk of pollution from a release is reduced to ALARP; installation of protective barriers (e.g. at the transformers); fire resistance of the battery enclosures; and application of a rigorous and formal management of change process for the Project, including hazard identification and risk assessment processes.	Operation
Visual		
V1	Lighting of the Site would be designed in accordance with *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	Construction

ID	Management and mitigation measure	Timing
	• 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 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

6.2 Construction Environmental Management Plan

A CEMP would be prepared for the Project. The CEMP would address the relevant requirements of the planning approval documentation (including management and 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 6.1** and may be required in any future conditions of consent.

6.3 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 relevant conditions of consent.

The OEMP would detail how the operational management and mitigation measures identified in **Section 6.1** 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 6.1**
- 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.

7.0 Conclusion

This Submissions Report addresses the requirement to consider and respond to all submissions received during the exhibition of the EIS. It also provides minor clarifications/additions to the assessment of the Project. No changes to the Project as described in the EIS (AECOM, 2021) are required following review of the submissions.

Overall, the EIS (AECOM, 2021) and this Submissions Report have 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 *Environmental Planning and Assessment Regulation (2000)* (NSW).

For these reasons, the benefits of the Project would outweigh any 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.

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

Appendix A

Flood Risk Assessment

AECOM Australia Pty Ltd
Level 21, 420 George Street
Sydney NSW 2000
PO Box Q410
QVB Post Office NSW 1230
Australia
www.aecom.com

+61 2 8934 0000 tel
+61 2 8934 0001 fax
ABN 20 093 846 925

Memorandum

To	AGL Energy Limited	Page	4
CC			
Subject	Ephemeral drainage line - flood assessment		
From	AECOM Australia Pty Ltd		
File/Ref No.		Date	30-Jul-2021

1.0 Introduction

The Environmental Impact Statement (EIS) for the Broken Hill Battery Storage System (BESS) was exhibited, and a submission was provided by the Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment (DPIE)on the 24 June 2021.

While a simple hydraulic assessment was undertaken as part of the EIS to ensure that the Site was not impacted by flooding from the local industrial catchment, there was no flood assessment undertaken along the adjacent ephemeral drainage line. As part of their submission, BCD has requested that a flood assessment along the ephemeral drainage line is completed. Specifically, BCD requested:

Complete quantitative flood modelling and assessments of the overland flow and ephemeral drainage lines to determine the flood liability of the site from all contributing catchments for appropriate design storm events.

AECOM Australia Pty Ltd (AECOM) has developed a one-dimensional hydraulic model along the ephemeral drainage line to estimate the flood extents and determine whether the Site would be impacted by floodwaters in a 1% annual exceedance probability (AEP) storm event. This memorandum has been prepared to document the adopted modelling approach, highlight key model parameters, and present the results.

2.0 Methodology

The adopted approach for estimating the 1% AEP flood extents along the ephemeral drainage line is as follows:

1. Estimate the peak flow rate along the ephemeral drainage line
2. Develop a one-dimensional (1D) HEC-RAS (i.e. hydraulic) model to estimate the flood extents
3. Assess the modelled results to determine whether the Site would be impacted by floodwaters in a 1% AEP storm event.

The above steps are detailed further in the following sections.

3.0 Peak flow estimation

There is large upstream catchment, in the order of 2.26 km^2, that contributes to flow along the ephemeral drainage line as moves past the Site. This catchment is shown in Figure 1.

The peak flow rate generated by this catchment and heading along the ephemeral drainage line, in a 1% AEP event, was estimated using the Rational Method. The following data was used to estimate the peak flow rate:

- The time of concentration was calculated using the Bransby-Williams equation, based on topographical data obtained from the NSW Government – Spatial Services

- Rainfall intensities were obtained from the Bureau of Meteorology (BoM)
- The percentage of impervious area across the catchment was approximated using the available aerial imagery.

The calculations indicated that the large upstream catchment would generate a peak flow rate in the order of 15.2 m^3/s in a 1% AEP storm event. These calculations are provided as an attachment.

This peak flow rate was applied as a steady state inflow at the upstream end of the HEC-RAS model described in the following section.

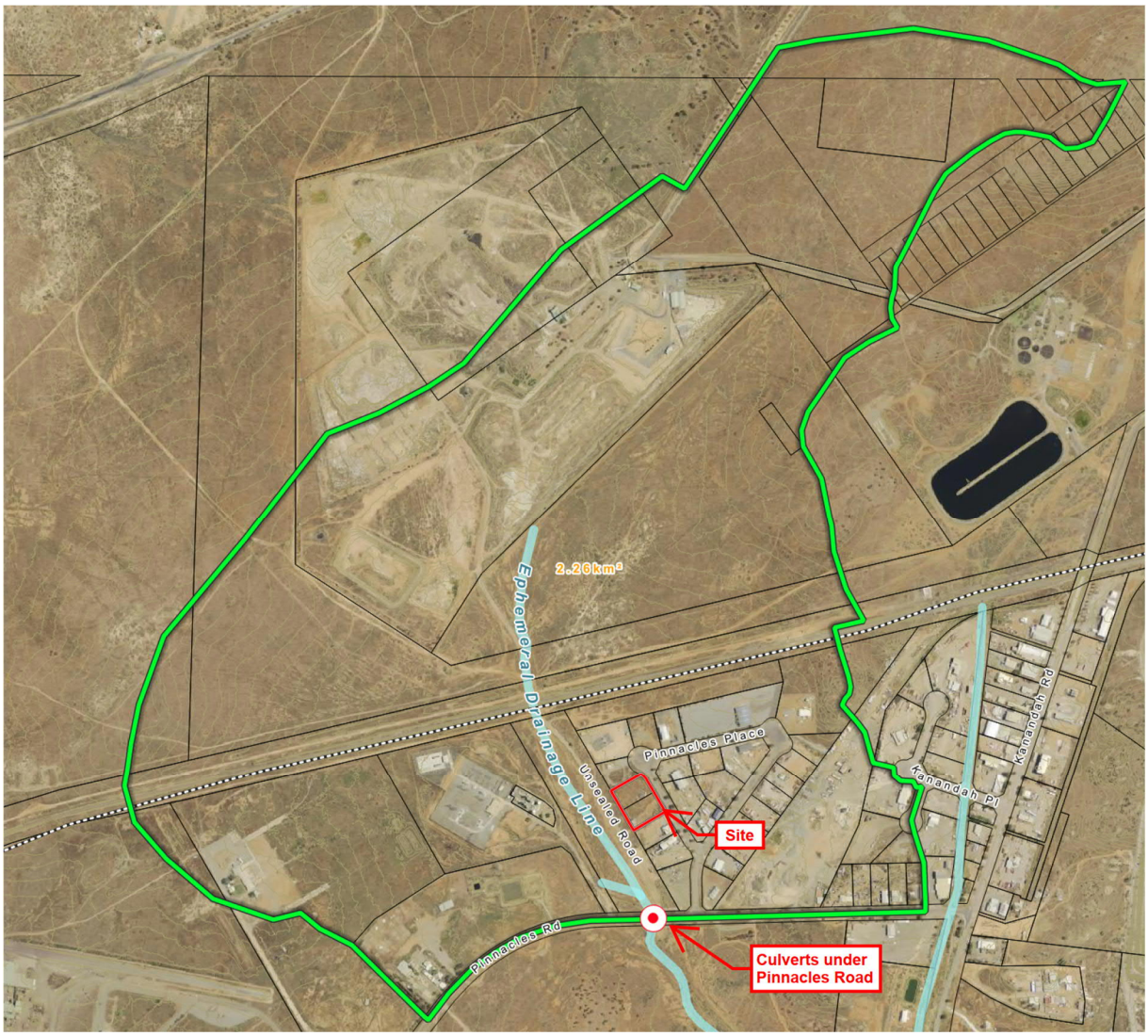


Figure 1 Upstream catchment

4.0 Hydraulic modelling

The HEC-RAS model was developed to estimate the peak flood depths, extents and velocities along the ephemeral drainage line, as it passes the Site, using the peak flow rate estimated above.

The model extends from the railway line at the northern end, to the culverts passing under Pinnacles Road, and approximately 200 m south of Pinnacles Road – a total length of approximately 700 m. The model was developed based on the following model parameters and assumptions:

- Cross-sections were generated at every 20 m interval along the main drainage line, using the available topographical data obtained from the NSW Government – Spatial Services

- The existing drainage line appears to be vegetated with sparse vegetation/brush spread across the adjacent floodplain. Figure 2 shows an example of the vegetation present along the drainage line. On this basis, the following Manning's roughness (n) values were adopted:
  - 0.080 for the heavily vegetated main channel
  - 0.070 for the sparse brush across the floodplain.
- Utilising Figure 3 and information that was interrogated from topographical data (e.g. the width of the main channel and depth below the road surface) it was estimated that the culvert crossing under Pinnacles Road comprises three (3) 2400 mm wide by 750 mm high box culverts. These culverts were added to the model.
- The longitudinal profile of the road was obtained from the available topographical data and was added to the model, as the road profile above the three culverts. This sets the weir level controlling the amount of flow that spills over the road when the capacity of the culverts is exceeded.
- The upstream and downstream model boundaries were defined using normal depth calculations. The adopted channel bed slopes used to estimate the normal depths were based on the available topographical data and were as follows:
  - 1.0% for the upstream model boundary
  - 0.3% for the downstream model boundary.

Figure 2 Ephemeral drainage line and adjacent floodplain

Figure 3 Culverts passing under Pinnacles Road

5.0 Modelled results

The modelled results for the 1% AEP event, including the flood extents, velocities and water surface profile, are attached. The flood extents, relative to the Site, are also shown in Figure 4.

It can be seen that the Site is not impacted by flooding along the ephemeral drainage line in all events up to and including the 1% AEP event. Based on existing surface levels along the western boundary of the Site, it can achieve at least 0.4 m freeboard to the 1% AEP flood levels. Important infrastructure within the Site would be set at even higher levels, which would provide an adequate level of flood protection to important infrastructure located within the Site.

Due to this amount of freeboard, surface water generated by the Site would be able to freely drain to the ephemeral drainage line (i.e. backwater effects caused by flooding within the ephemeral drainage line would not extend into the Site). It should also be noted that the time at which these peak flows move past the Site would not coincide with the timing of peak flows discharging from the Site. Therefore, when flows discharge from the Site, the flood extents and flood levels within the ephemeral drainage line are expected to be significantly reduced/lower.

As the Site is not inundated by the 1% AEP floodwaters moving along the ephemeral drainage line, works within the Site would not directly impact the conveyance of flows nor flood storage along this drainage line.

The modelled results also indicate that velocities within the ephemeral drainage line are expected to remain below 1.0 m/s (generally around 0.5 to 0.8 m/s for most of its length) in the 1% AEP event. These velocities are not expected to cause significant erosion of the channel – especially with the large amount of vegetative cover that is present within the main channel. These velocities are also consistent with existing conditions and are not increased as a result of the Project.

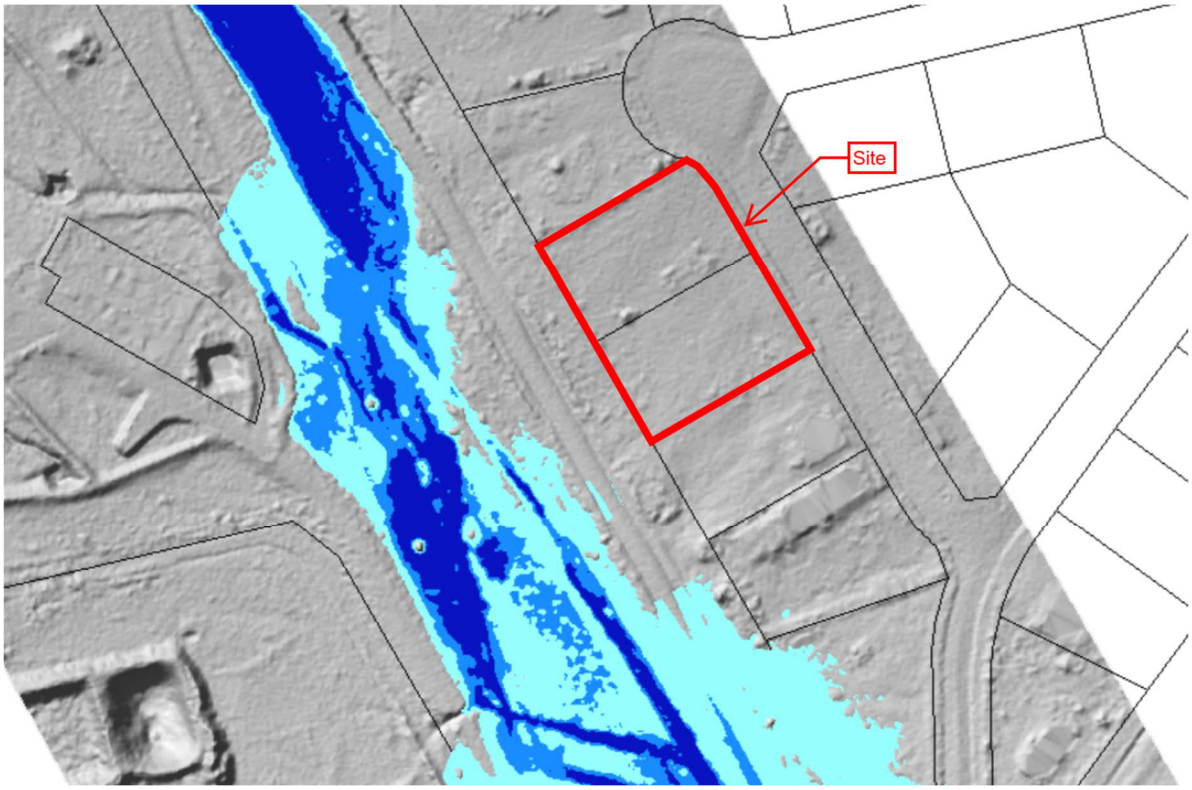


Figure 4 Modelled flood extents

6.0 Sensitivity analysis

In order to assess the changes in flooding extents due to a number of key hydraulic stressors, the model was adjusted by:

- Increasing the applied peak flow rate by approximately 30% – to a peak flow rate of 20 m^3/s.
- Reducing the channel bed slope at the downstream end of the model from 0.3 to 0.1%.
- Allowing for 30% blockage across the three culverts passing under Pinnacles Road.

Under these more extreme conditions, the modelled results showed that the Site would still be protected from floodwaters moving along the adjacent ephemeral drainage line. The above hydraulic stressors caused flood levels moving past the Site to raise by approximately 0.05 m, such that the Site could still maintain a minimum freeboard of 0.35 m in a 1% AEP event (i.e. only slightly less than the 0.4 m of freeboard achieved under 'normal' conditions, discussed in Section 5.0).

7.0 Conclusion

Through undertaking a flood assessment along the adjacent ephemeral drainage line, it was determined that the Site would not be impacted by floodwaters moving along this drainage line in all events up to and including the 1% AEP event. It is estimated that the Site would be capable of achieving a minimum freeboard of 0.40 m to 1% AEP flood levels along the ephemeral drainage line.

The only other upstream catchment with the potential to inundate the Site, is the local industrial catchment (to the east) which contributes to flow moving along Pinnacles Place. A simple hydraulic assessment of this catchment was undertaken as part of the EIS. The assessment determined that the Pinnacles Place road reserve was capable of containing all of the 1% AEP flows generated by this catchment. Therefore, the Site would not be impacted by floodwaters generated by local catchments.

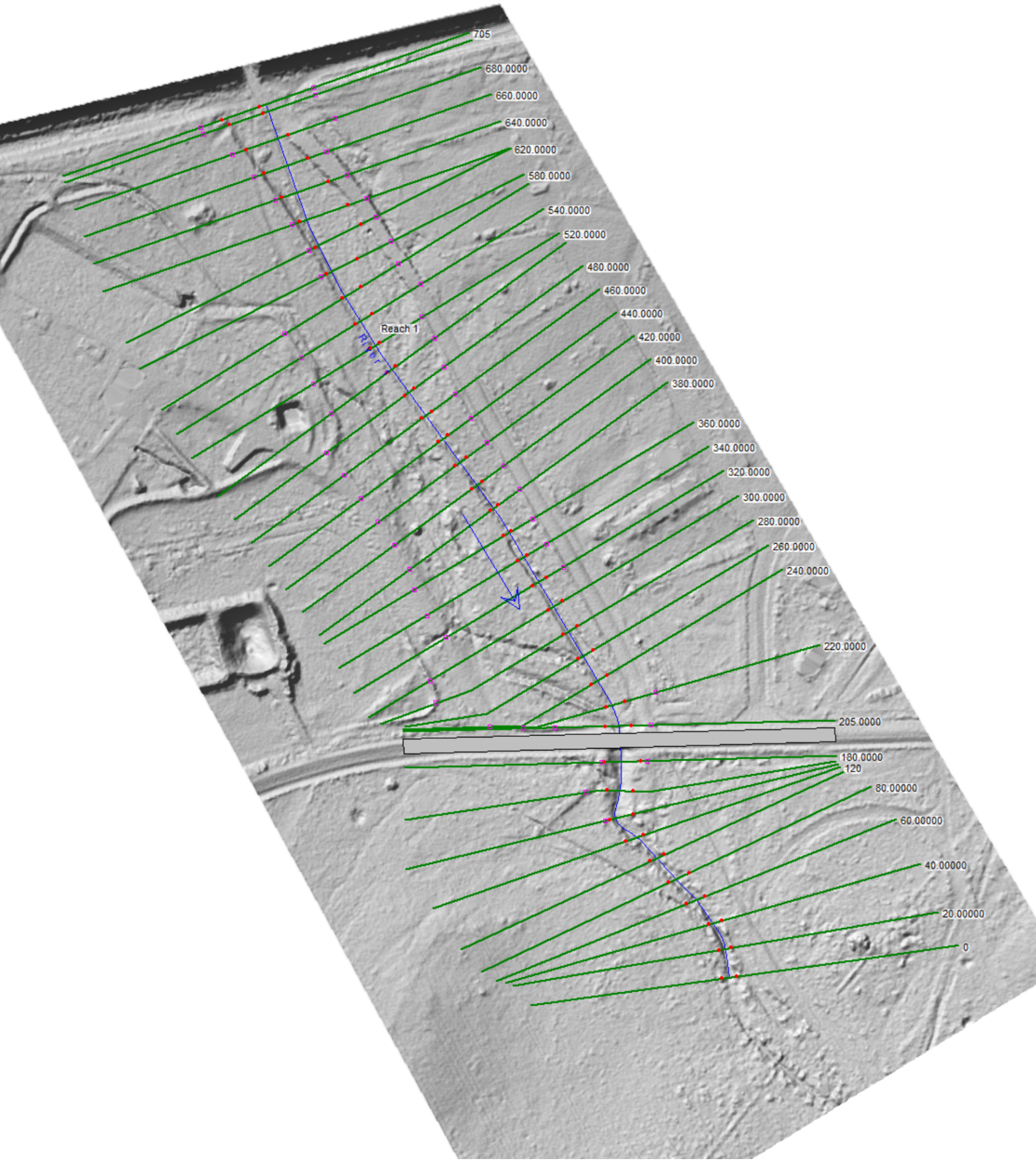
On this basis, it has been concluded that:

- The Site would not be impacted by floodwaters from all contributing catchments (i.e. coming from both the large ephemeral drainage line catchment as well as the local upstream/industrial catchment). Therefore, the Site would be protected from flooding (due to external flows) in all events up to and including a 1% AEP event. The Site would also not obstruct existing flood flow paths nor would it impact existing flood conditions.
- Management of flooding at the Site would consist of managing surface runoff generated by the Site itself.
- Based on the above findings, the statement included in the EIS – that floodwaters moving along the ephemeral drainage line could be contained within the 120-m wide Crown Reserve – remains valid.

1% AEP flow generated by the large upstream catchment

Rational Method		
Catchment area (A)	2.26	km²
Flow path length	2.3	km
Upstream elevation	303.0	mAHD
Downstream elevation	280.0	mAHD
Fall across flow path	23.0	m
Longitudinal slope (S)	1.00	%
Time of concentration (t_c)	77	mins
Rainfall intensity (I_{100})	49.5	mm/hr
Impervious area	0.4	km²
Runoff coefficient for pervious areas	0.3	
Runoff coefficient for impervious areas	0.9	
Base runoff coefficient (C_{10})	0.41	
Storm runoff coefficient (C_{100})	0.49	
Discharge	15.2	m³/s

Broken Hill BESS - HEC-RAS Modelling
Model Setup



Broken Hill BESS - HEC-RAS modelling
Modelled Results

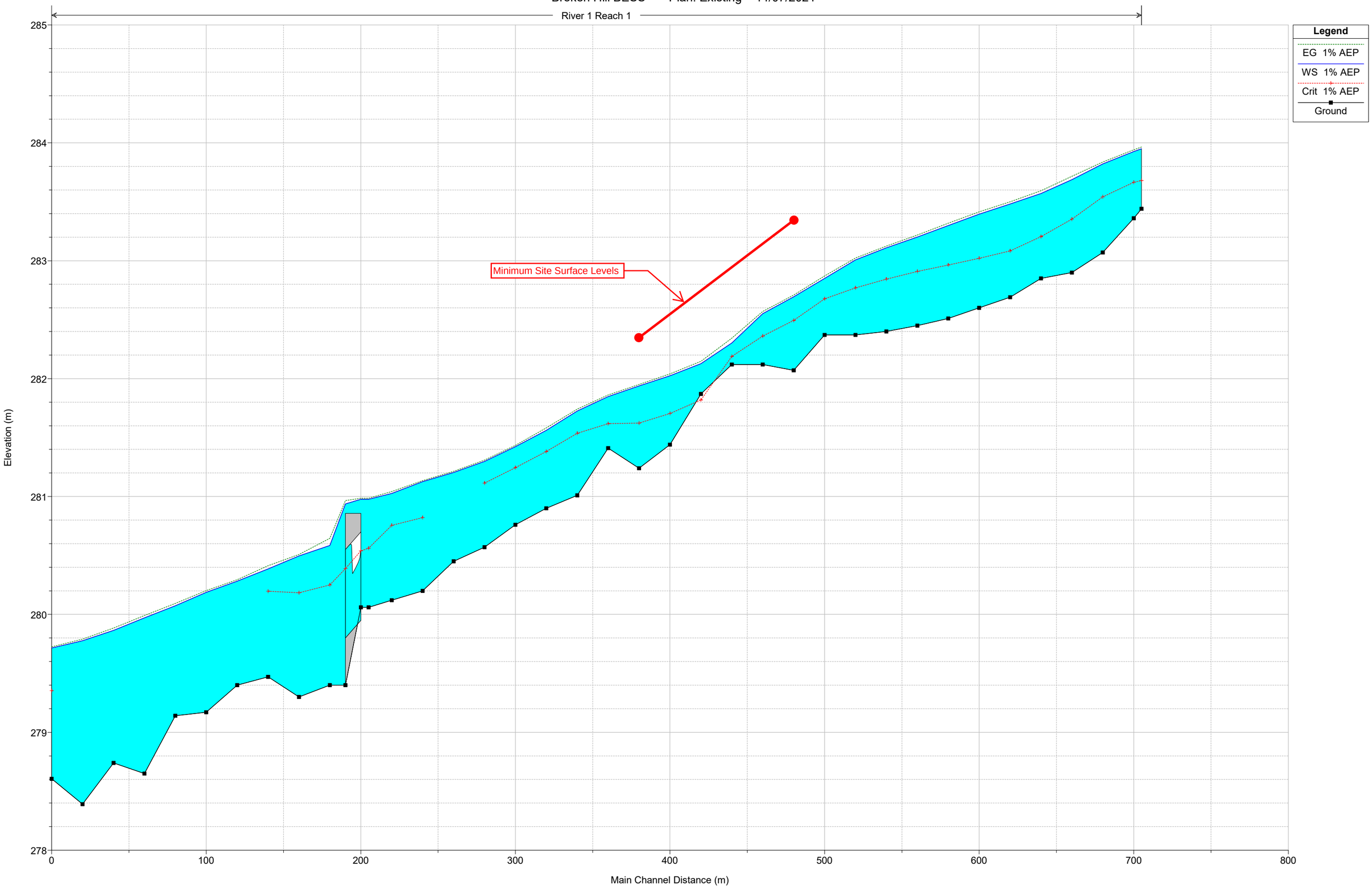
HEC-RAS Plan: EXG River: River 1 Reach: Reach 1 Profile: 1% AEP

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 1	705	1% AEP	15.20	283.44	283.95	283.68	283.96	0.004743	0.47	28.41	68.46	0.24
Reach 1	700.0000	1% AEP	15.20	283.36	283.93	283.67	283.94	0.004783	0.50	28.08	65.66	0.24
Reach 1	680.0000	1% AEP	15.20	283.07	283.82	283.54	283.84	0.005465	0.59	27.20	64.85	0.26
Reach 1	660.0000	1% AEP	15.20	282.90	283.69	283.35	283.72	0.006809	0.75	20.81	37.11	0.30
Reach 1	640.0000	1% AEP	15.20	282.85	283.57	283.21	283.59	0.005319	0.68	22.76	37.53	0.27
Reach 1	620.0000	1% AEP	15.20	282.69	283.48	283.08	283.50	0.004044	0.61	25.90	43.54	0.24
Reach 1	600.0000	1% AEP	15.20	282.60	283.40	283.02	283.41	0.004627	0.63	24.97	44.37	0.25
Reach 1	580.0000	1% AEP	15.20	282.51	283.30	282.96	283.32	0.005002	0.65	24.12	45.37	0.26
Reach 1	560.0000	1% AEP	15.20	282.45	283.20	282.91	283.22	0.004822	0.65	28.06	82.63	0.26
Reach 1	540.0000	1% AEP	15.20	282.40	283.11	282.84	283.12	0.004581	0.60	29.99	85.84	0.25
Reach 1	520.0000	1% AEP	15.20	282.37	283.01	282.77	283.02	0.005761	0.64	27.17	73.40	0.27
Reach 1	500.0000	1% AEP	15.20	282.37	282.85	282.68	282.87	0.010220	0.71	23.33	76.08	0.35
Reach 1	480.0000	1% AEP	15.20	282.07	282.69	282.49	282.71	0.006175	0.56	27.99	86.08	0.27
Reach 1	460.0000	1% AEP	15.20	282.12	282.55	282.36	282.57	0.007667	0.48	25.33	78.25	0.28
Reach 1	440.0000	1% AEP	15.20	282.12	282.30	282.19	282.34	0.019718	0.42	17.33	61.34	0.39
Reach 1	420.0000	1% AEP	15.20	281.87	282.13	281.82	282.15	0.005383	0.24	24.82	61.06	0.21
Reach 1	400.0000	1% AEP	15.20	281.44	282.02	281.70	282.04	0.005092	0.36	27.36	76.91	0.23
Reach 1	380.0000	1% AEP	15.20	281.24	281.94	281.62	281.95	0.003981	0.44	30.93	83.70	0.22
Reach 1	360.0000	1% AEP	15.20	281.41	281.85	281.62	281.86	0.005364	0.41	29.47	87.37	0.24
Reach 1	340.0000	1% AEP	15.20	281.01	281.73	281.54	281.74	0.006733	0.63	27.70	86.95	0.29
Reach 1	320.0000	1% AEP	15.20	280.90	281.56	281.38	281.58	0.009565	0.74	24.04	88.20	0.34
Reach 1	300.0000	1% AEP	15.20	280.76	281.42	281.25	281.43	0.005719	0.56	32.69	132.72	0.26
Reach 1	280.0000	1% AEP	15.20	280.57	281.30	281.11	281.31	0.006799	0.61	33.05	148.37	0.29
Reach 1	260.0000	1% AEP	15.20	280.45	281.20		281.21	0.003585	0.54	38.25	162.07	0.22
Reach 1	240.0000	1% AEP	15.20	280.20	281.13	280.82	281.14	0.004201	0.58	38.72	154.54	0.24
Reach 1	220.0000	1% AEP	15.20	280.12	281.03	280.76	281.04	0.005353	0.70	28.71	83.67	0.27
Reach 1	205.0000	1% AEP	15.20	280.06	280.98	280.56	280.99	0.002529	0.53	42.58	142.16	0.19
Reach 1	195		Culvert									
Reach 1	180.0000	1% AEP	15.20	279.40	280.58	280.25	280.65	0.016097	1.09	14.08	27.55	0.46
Reach 1	160.0000	1% AEP	15.20	279.30	280.50	280.18	280.51	0.003183	0.59	34.19	96.46	0.21
Reach 1	140	1% AEP	15.20	279.47	280.39	280.20	280.41	0.009703	0.86	22.59	77.13	0.36
Reach 1	120	1% AEP	15.20	279.40	280.28		280.29	0.004246	0.61	33.51	116.12	0.24
Reach 1	100	1% AEP	15.20	279.17	280.19		280.20	0.005022	0.72	30.62	95.95	0.27
Reach 1	80.00000	1% AEP	15.20	279.14	280.07		280.09	0.005826	0.75	27.11	80.57	0.29
Reach 1	60.00000	1% AEP	15.20	278.65	279.97		279.99	0.004630	0.75	28.65	90.36	0.26
Reach 1	40.00000	1% AEP	15.20	278.74	279.86		279.88	0.006239	0.79	27.10	86.21	0.30
Reach 1	20.00000	1% AEP	15.20	278.39	279.78		279.79	0.003550	0.69	33.05	94.20	0.23
Reach 1	0	1% AEP	15.20	278.61	279.72	279.35	279.72	0.003004	0.56	37.46	107.88	0.21

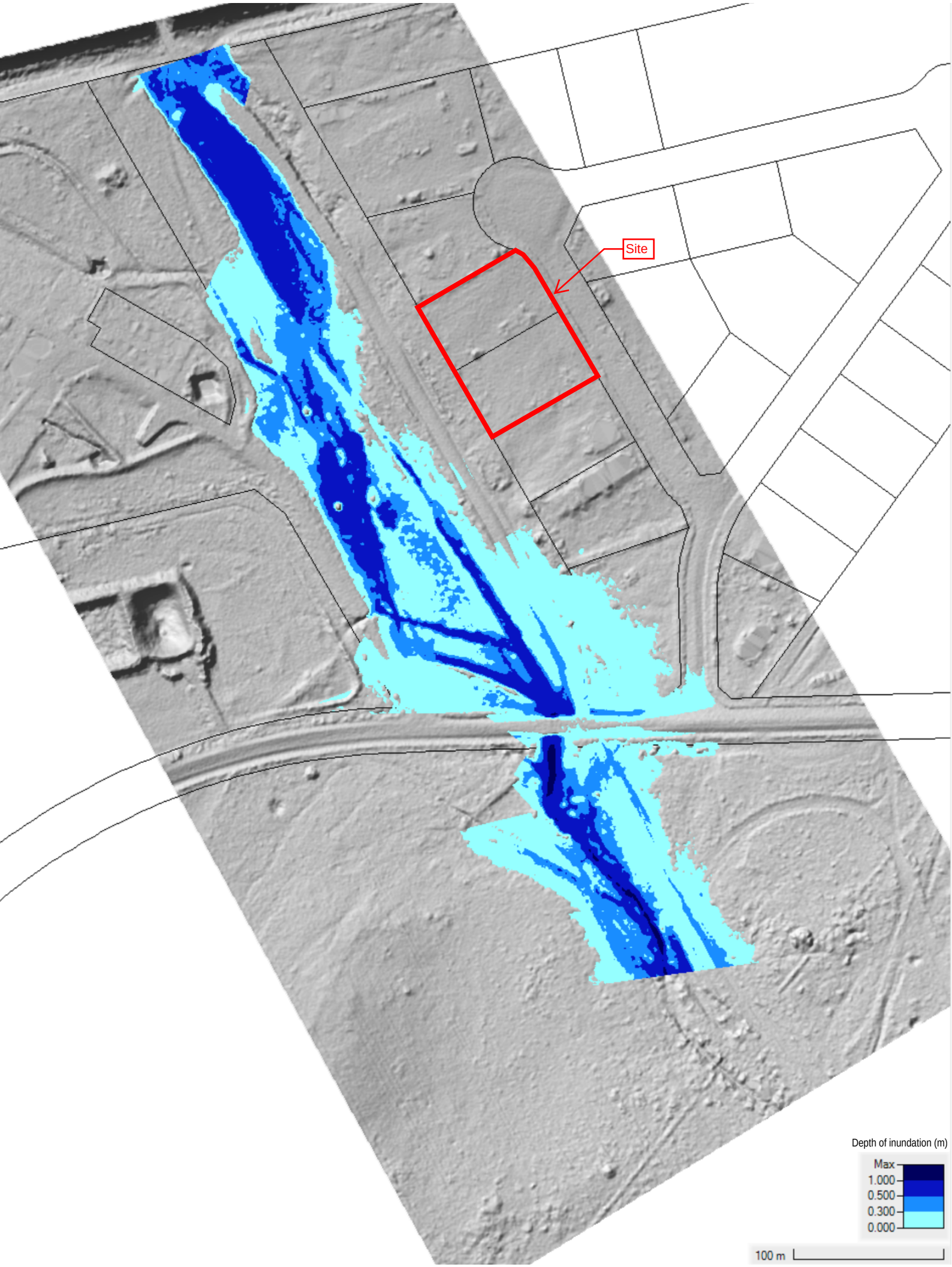
Broken Hill BESS - HEC-RAS Modelling
Water Surface Profile

Broken Hill BESS Plan: Existing 14/07/2021

River 1 Reach 1

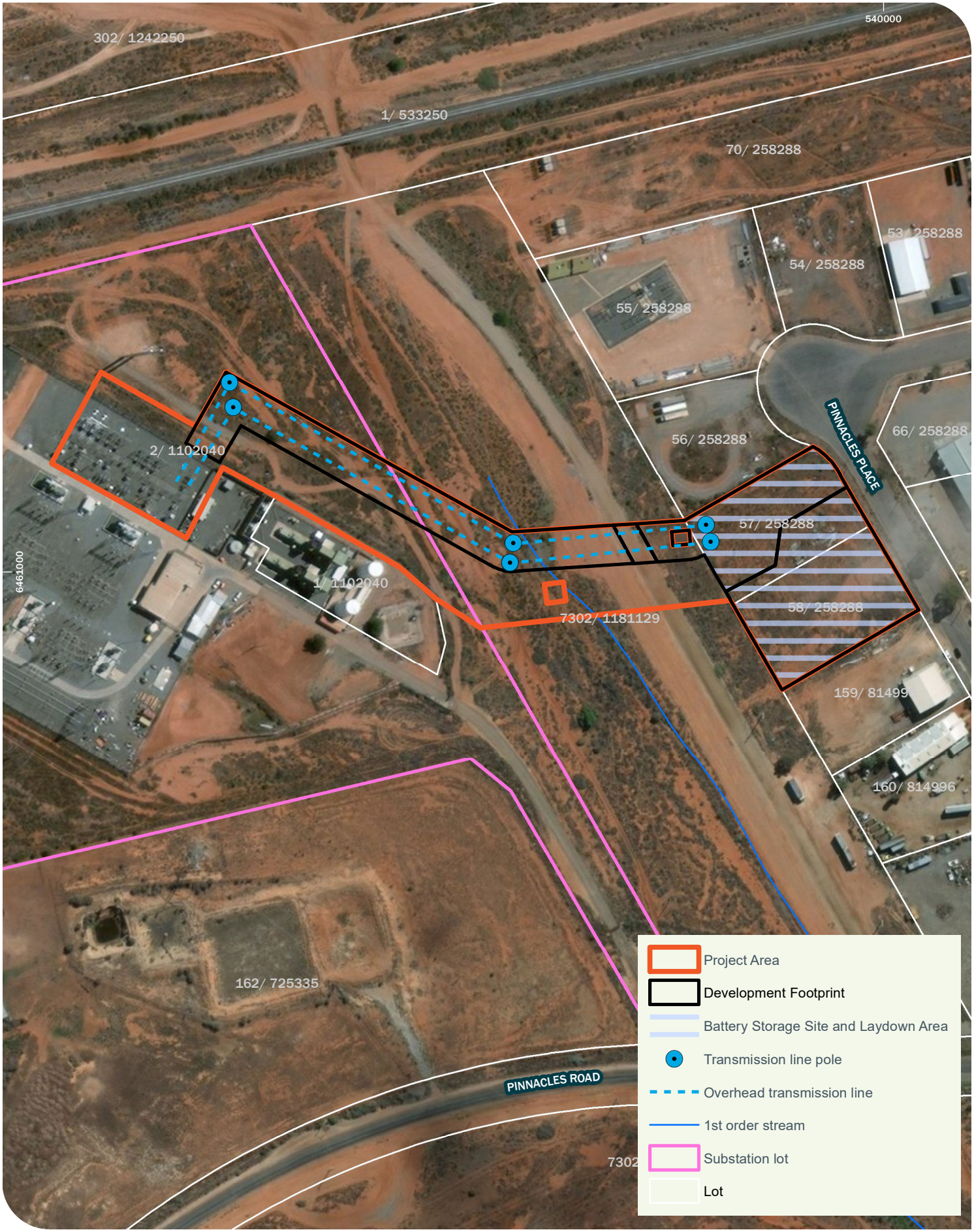


Broken Hill BESS - HEC-RAS Modelling
1% AEP Flood Depths



Appendix B

Biodiversity Figures



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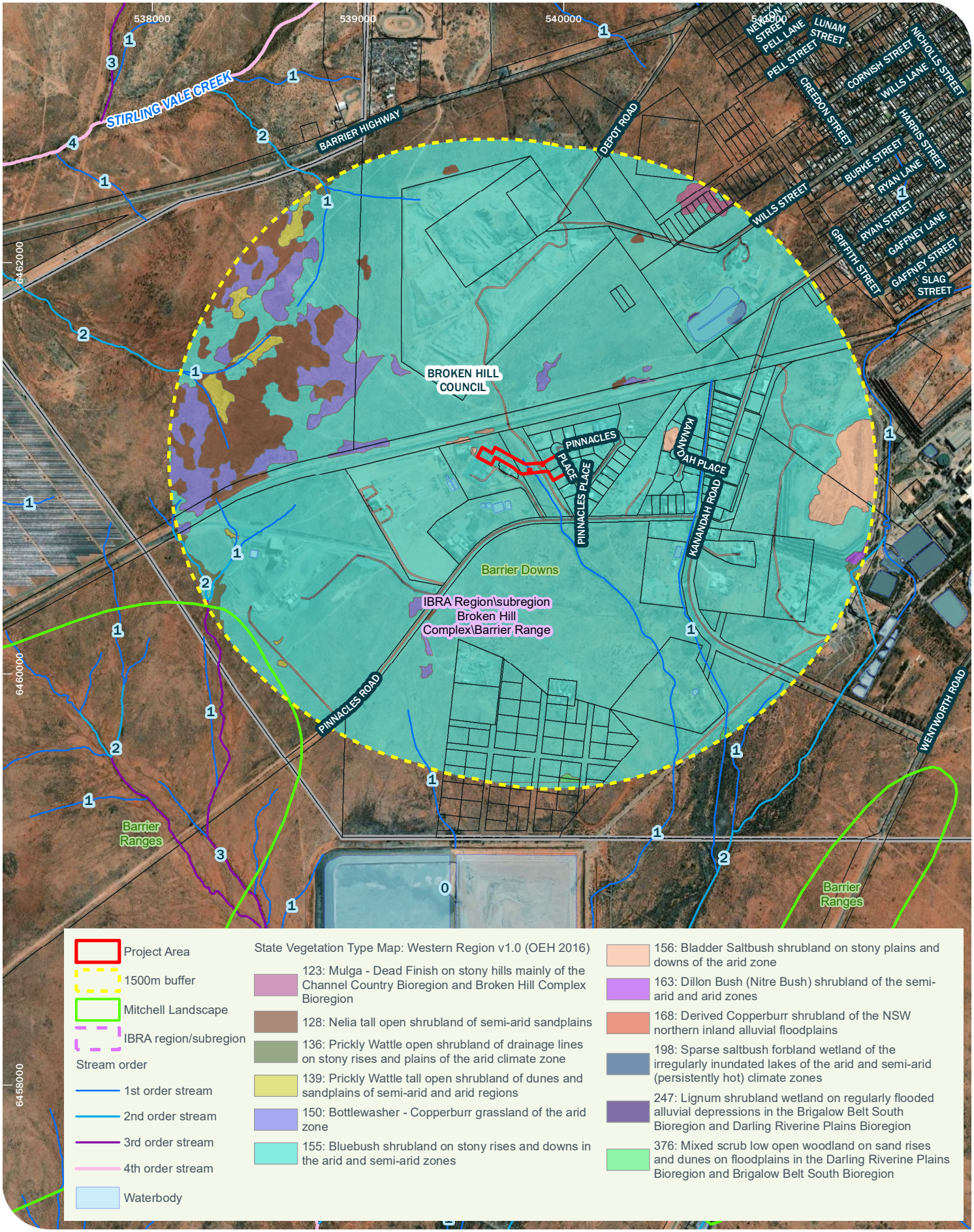
GDA 1994 MGA Zone 54

Site Map
Broken Hill Battery Storage BDAR

Niche PM: Patrick McEvoy
Niche Proj. #: 5475
Client: AECOM

Figure 1

v2.0



Project Area
1500m buffer
Mitchell Landscape
IBRA region/subregion

Stream order
1st order stream
2nd order stream
3rd order stream
4th order stream
Waterbody

State Vegetation Type Map: Western Region v1.0 (OEH 2016)

123: Mulga - Dead Finish on stony hills mainly of the Channel Country Bioregion and Broken Hill Complex Bioregion
128: Nelia tall open shrubland of semi-arid sandplains
136: Prickly Wattle open shrubland of drainage lines on stony rises and plains of the arid climate zone
139: Prickly Wattle tall open shrubland of dunes and sandplains of semi-arid and arid regions
150: Bottlewasher - Copperburr grassland of the arid zone
155: Bluebush shrubland on stony rises and downs in the arid and semi-arid zones
156: Bladder Saltbush shrubland on stony plains and downs of the arid zone
163: Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones
168: Derived Copperburr shrubland of the NSW northern inland alluvial floodplains
198: Sparse saltbush forbland wetland of the irregularly inundated lakes of the arid and semi-arid (persistently hot) climate zones
247: Lignum shrubland wetland on regularly flooded alluvial depressions in the Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion
376: Mixed scrub low open woodland on sand rises and dunes on floodplains in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

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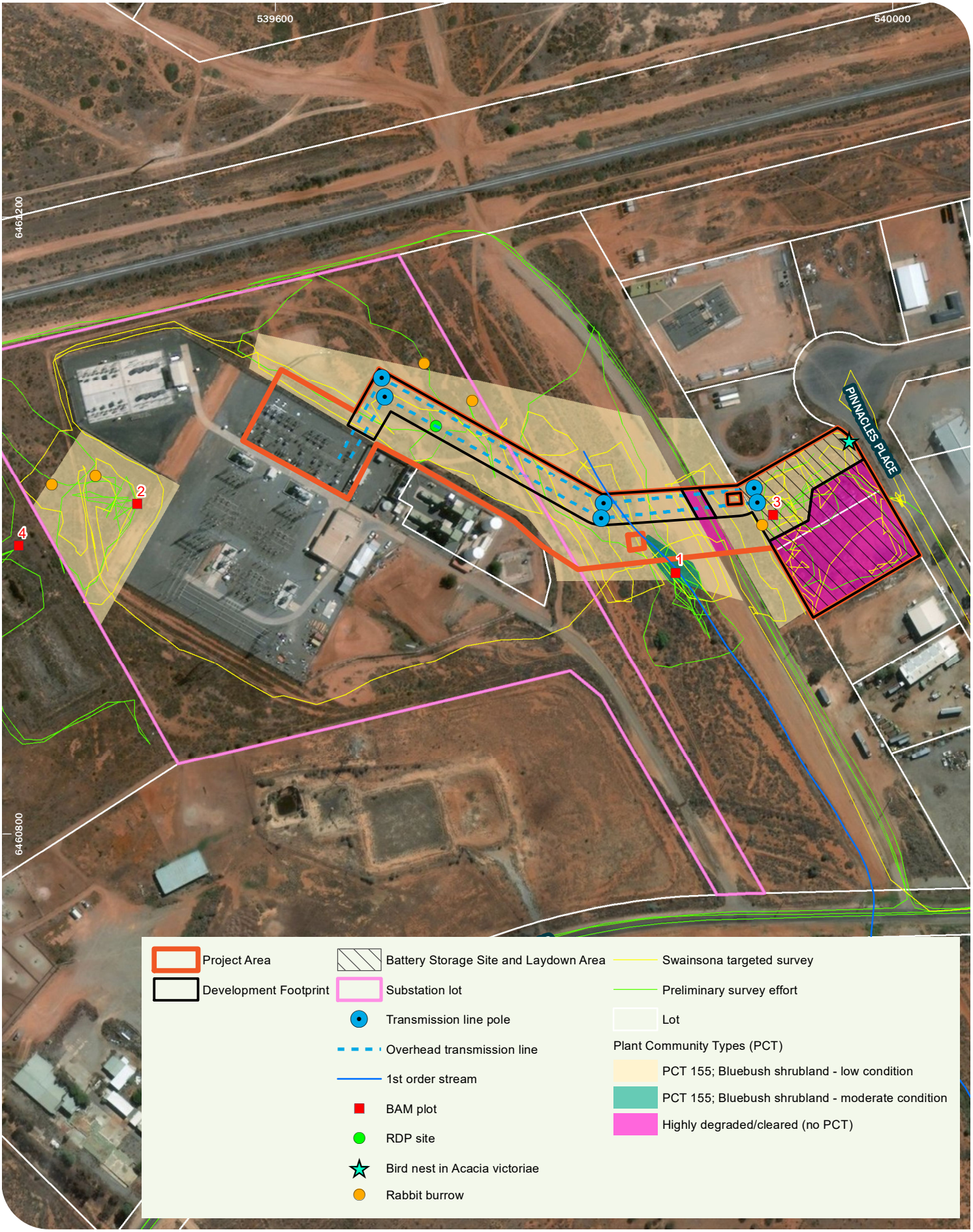
GDA 1994 MGA Zone 54

Location Map
Broken Hill Battery Storage BDAR

Niche PM: Patrick McEvoy
Niche Proj. #: 5475
Client: AECOM

Figure 2



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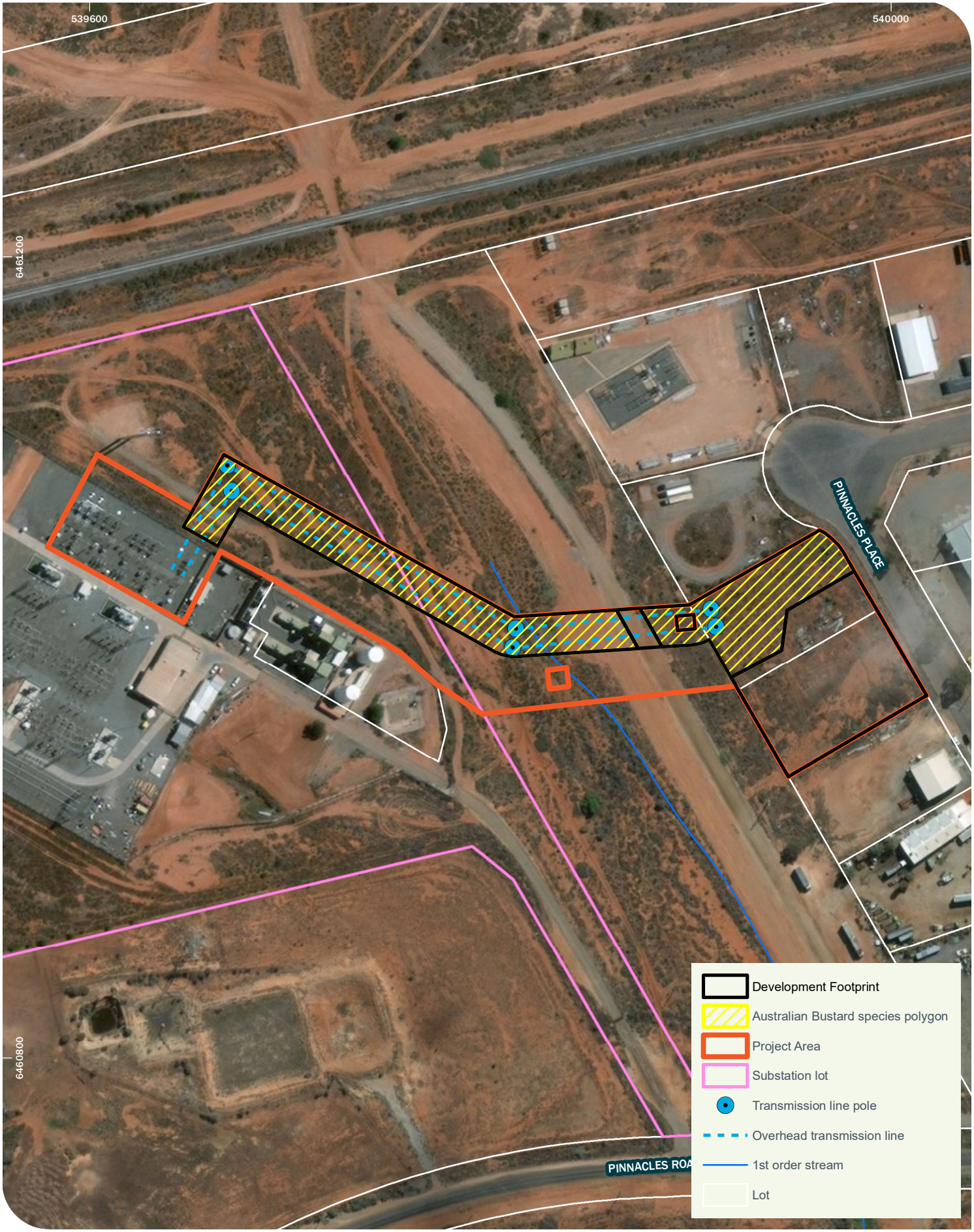
GDA 1994 MGA Zone 54

Vegetation zones and plot locations
Broken Hill Battery Storage BDAR

Niche PM: Patrick McEvoy
Niche Proj. #: 5475
Client: AECOM

Figure 3



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GDA 1994 MGA Zone 54

Species polygon: Australian Bustard
Broken Hill Battery Storage BDAR

Niche PM: Patrick McEvoy
Niche Proj. #: 5475
Client: AECOM

Figure 4

World Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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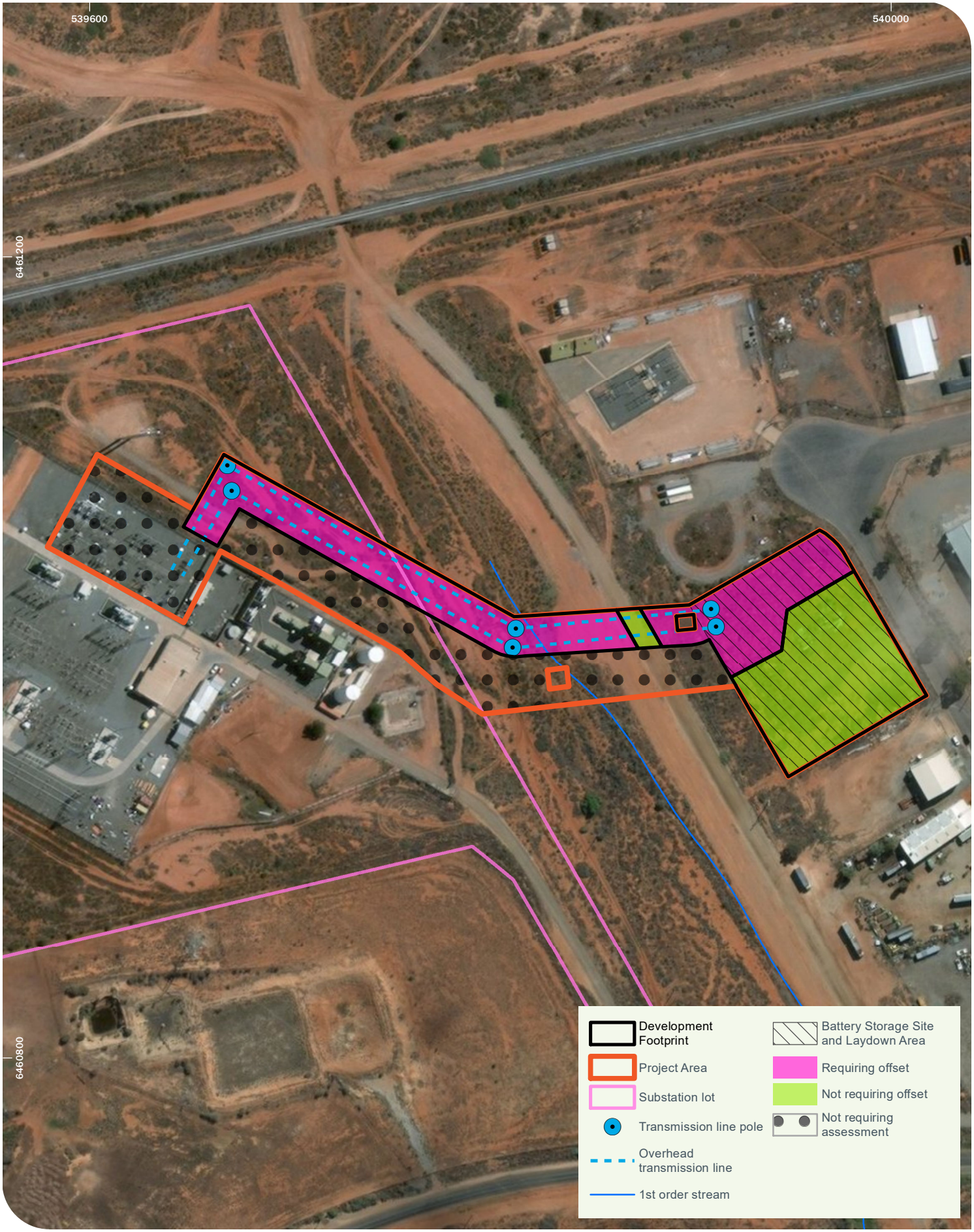

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GDA 1994 MGA Zone 54

Impact Summary
Broken Hill Battery Storage BDAR

Niche PM: Patrick McEvoy
Niche Proj. #: 5475
Client: AECOM

Figure 5

World Imagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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