EnergyCo

Waratah Super Battery – Munmorah

Response to Subsmissions Report

January 2023

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NSW GOVERNMENT

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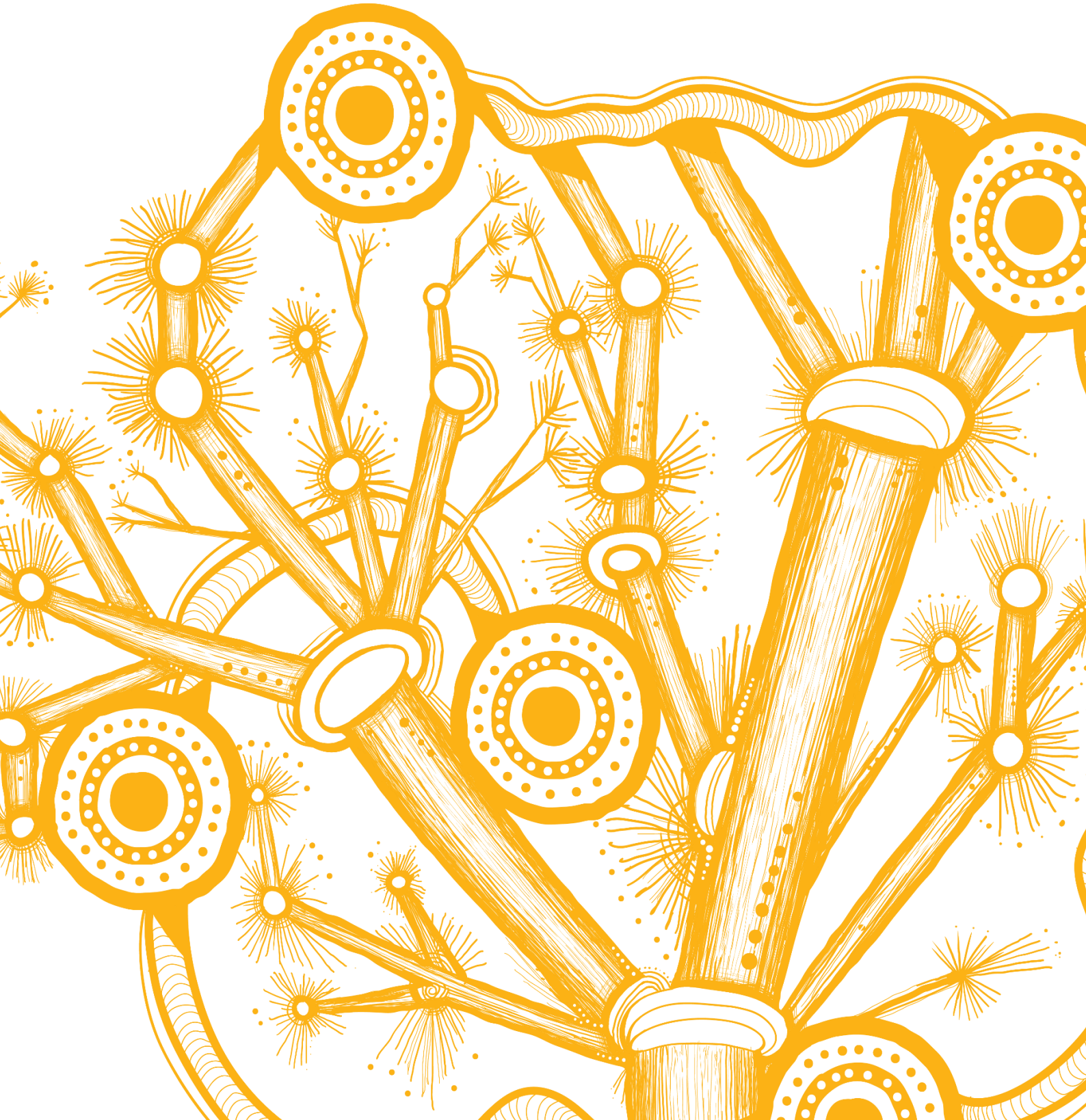
Acknowledgement of Country

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.



Terms and abbreviations

Term/abbreviation	Definition
AHD	Australian Height Datum
APZ	Asset Protection Zone
BCD	Biodiversity Conservation Division
BESS	Battery Energy Storage System
BDAR	Biodiversity Development Assessment Report
CSSI	Critical State Significant Infrastructure
CTMP	Construction Traffic Management Plan
DPE	Department of Planning and Environment (NSW)
DPIE	Department of Planning, Industry and Environment (NSW)
EIS	Environmental Impact Statement
EnergyCo	Energy Corporation of NSW
EP&A Act/ Regulation	*Environmental Planning and Assessment Act 1979* / Regulation 2021 (NSW)
EPA	Environment Protection Authority
ERP	Emergency Response Plan
FRNSW	Fire and Rescue NSW
FSS	Fire Safety Study
GHD	GHD Pty Ltd
GPM	Generator Property Management Pty Ltd
HIPAP	Hazardous Industry Planning Advisory Paper
kV	Kilovolt
LGA	Local Government Area
MW	Megawatts
MWh	Megawatt hours
NSW	New South Wales
OSOM	Oversize over mass
PHA	Preliminary Hazard Analysis
PMF	Probable Maximum Flood
REDS	*Central Coast and Lake Macquarie Regional Economic Development Strategy (REDS) 2018-2022*
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SIDRA	A software model used to evaluate the performance of traffic intersections and networks.
SIPS	System Integrity Protection Scheme
TfNSW	Transport for NSW
TIA	Traffic Impact Assessment
WM Act	*Water Management Act 2000* (NSW)

Executive Summary

Background

The New South Wales (NSW) Government, through the Energy Corporation of NSW (EnergyCo), is developing the 'Waratah Super Battery' (the project) to ensure NSW continues to have reliable, affordable energy supplies following the planned closure of the Eraring Power Station in 2025.

The project is declared Critical State Significant Infrastructure (CSSI) and is subject to assessment under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and approval by the Minister for Planning.

The project described and assessed in the environmental impact statement (EIS) includes the following key features:

– A System Integrity Protection Scheme (SIPS) system, designed to reserve and deploy battery power to support the NSW electricity grid when triggered by a contingency event.
– Up to 850 megawatts (MW) active power.
– Up to 1,680-megawatt hours (MWh) battery storage capacity.
– Connecting transmission and related infrastructure to connect the SIPS to the existing grid.
– Other infrastructure and services required for the project.

The EIS was prepared to assess the potential impacts of the project, and to identify the management measures to address those impacts. The EIS was exhibited by the NSW Department of Planning and Environment (DPE) from 11 November 2022 to 8 December 2022.

Response to submissions report

Thirteen submissions from NSW Government agencies, one submission from the Central Coast Council and seven community submissions were received during the public exhibition period.

Following the receipt of submissions, the NSW DPE directed EnergyCo to prepare a written response to the issues raised in the submissions in the form of a submissions report having regard to the *State Significant Infrastructure Guidelines – Preparing a Submissions Report (DPIE 2022).*

The submissions are available to view and download on the DPE Major Projects website for the Waratah Super Battery (**https://www.planningportal.nsw.gov.au/major-projects/projects/waratah-super-battery-energy-storage-system**).

The issues most commonly raised in submissions included:

– Bushfire risk
– Traffic and access
– Social and economic
– Noise.

Responses to these and other issued raised are provided in Chapters 4, 5 and 6 of this document.

Actions taken since exhibition of the EIS

Consultation with community and stakeholders

At the time of finalising the EIS in late 2022, the NSW Government appointed Akaysha Energy to be the service provider responsible for delivery of the Waratah Super Battery. Since late 2022, Akaysha Energy and its partners have reviewed the contents of the EIS and commenced setup of the design and delivery processes necessary to progress the project. This has included activities such as receiving preliminary design information and stakeholder details from EnergyCo, confirming preferred equipment suppliers as well as responding to technical queries from

EnergyCo. An updated site layout plan has also been prepared and incorporated into this submissions report (refer to Figure 4.1 of Appendix D).

EnergyCo, its service provider Akaysha Energy and the site owner Generator Property Management Pty Ltd (GPM) have continued to meet with key stakeholders to progress the project or in relation to issues made in submissions. This includes in relation to traffic and transport, bushfire and hazards and other site-based matters. Correspondence and/or meetings with the following organisations have been undertaken since EIS exhibition:

– DPE – Hazards branch
– DPE – Biodiversity Conservation Division (BCD)
– NSW Fire+Rescue
– Transport for NSW (TfNSW)
– Subsidence Advisory NSW.

Project refinements and additional assessment

Based on feedback from stakeholder meetings and concerns raised in submissions to the EIS, a number of project refinements have been made in this submissions report. The proposed project refinements are minor in nature and have been made to align the EIS documentation more closely with the proposed facility design. Refinements made to the project are outlined in Section 3.3.

An updated preliminary hazard assessment (refer to Section 3.2.1 and Appendix D) has been completed and demonstrates compliance with the HIPAP 4 risk criteria and the frequency of a fatality or injury negligible for both onsite and offsite locations.

Additional flora surveys were undertaken in November and December 2022 to investigate those species that could not be positively identified during the previous field surveys due to factors such as seasonal and weather considerations and flowering periods. No threatened flora species were detected during the additional surveys and as a result these species have been removed from the BAM-C credit calculations for the candidate threatened species (Species credits) section of the offsets calculator. The updated credit reports are provided in Appendix C and summarised in Table 3.1.

Revised environmental management measures

Mitigation measures proposed in the EIS have been reviewed following consultation meetings conducted and following review of submissions. Minor amendments have been made to ensure environmental management sub-plans are prepared in conjunction with relevant approval authorities or other parties with an interest. Minor amendments to measures related to traffic and transport have been made and are included in Appendix B.

Project justification and conclusion

Following public exhibition of a comprehensive EIS, EnergyCo has undertaken additional environmental assessments and made a number of minor refinements to the project to more fully align the assessment with the current design of the facility provided by Akaysha Energy. A number of minor changes have also been made to the proposed mitigation measures to respond to specific issues of concern raised in submissions and to more fully tailor them to the project issues and risks.

The project received only a small number of submissions, with the majority from NSW Government agencies either supportive, recommending conditions or identifying matters that can be readily addressed during subsequent project development processes.

The project is critical to support the NSW Government's electricity strategy and infrastructure roadmap. The project has been designed and assessed with regard to the matters for consideration under Section 5.16 of the EP&A Act and is consistent with the principles of ecologically sustainable development and therefore in the public interest.

It is recommended the project is approved.

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1. Introduction

1.1 Background

The NSW Government, through EnergyCo, is developing the 'Waratah Super Battery' (the project) to ensure NSW continues to have reliable, affordable energy supplies following the planned closure of the Eraring Power Station in 2025.

The project is declared CSSI and is subject to assessment under Part 5, Division 5.2 of the EP&A Act and approval by the Minister for Planning.

An EIS was prepared to assess the potential impacts of the project, and to identify the management measures to address those impacts. The EIS was exhibited by the NSW DPE from 11 November 2022 to 8 December 2022.

On 9 December 2022, the Planning Secretary requested EnergyCo submit a response to the issues raised in submissions to the EIS in accordance with section 5.17(6)(a) of the EP&A Act. This submissions report identifies and responds to the issues raised during the public exhibition of the EIS and identifies updated environmental management measures as well as the outcomes from an updated impact assessment of biodiversity and hazards and risks based upon additional site survey and refined design information respectively.

1.2 Overview of the project

The project described and assessed in the EIS includes the following key features:

– A SIPS system, designed to reserve and deploy battery power to support the NSW electricity grid when triggered by a contingency event.
– Up to 850 MW active power.
– Up to 1,680- MWh battery storage capacity.
– Connecting transmission and related infrastructure to connect the SIPS to the existing grid.
– Other infrastructure and services required for the project.

Figure 2.1 shows the location of the project site within the boundaries of the former Munmorah power station site on the Central Coast of NSW.

Commissioning of the Waratah Super Battery is subject to planning approval and the completion of detailed design however a core service of 350MW is anticipated to be operational by November 2024 and the final stage up to 850MW is expected to be operational by March 2025, prior to the closure of Eraring power station.

A more detailed description of the project and how the potential impacts would be managed and mitigated is provided in Chapter 3 of the EIS.

1.3 Purpose and structure of this report

EnergyCo has prepared this submissions report to address the Planning Secretary's request to submit a response to the issues raised in submissions to the EIS and with regard to the State significant Infrastructure guidelines – preparing a submissions report.

This submissions report identifies the issues raised during exhibition of the environmental impact statement and provides responses to those issues.

The remainder of this report is structured as follows:

– Chapter 2 – analysis of submissions
– Chapter 3 – actions taken since exhibition including additional assessment and community and stakeholder consultation
– Chapter 4 – response to NSW Government agency submissions
– Chapter 5 – response to Central Coast Council submission

– Chapter 6 – response to community and stakeholder submissions
– Chapter 7 – updated project justification and conclusion

A register of submissions received, table of updated environmental management measures and additional assessment information is provided in the appendices to this document.

2. Analysis of submissions

2.1 Overview

The Secretary of the Department of Planning and Environment received 21 submissions during the exhibition of the project and provided copies of the submissions to EnergyCo.

The submissions received during the exhibition period were from the following:

– 13 from government agencies
– 1 from local councils
– 1 from special interest groups
– 6 from the community.

Each submission has been examined individually to analyse how the submission relates to groups, people, and stakeholders in the community and to understand the issues raised and how they may be interrelated to the community and stakeholders. The breakdown or number of times a particular issue was raised in the submission is illustrated in Figure 2.1.

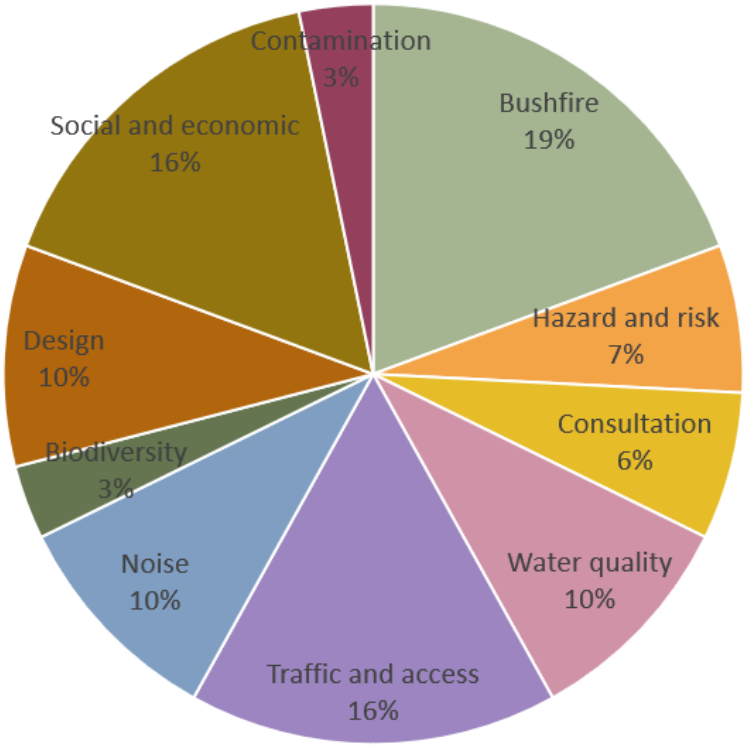


Figure 2.1 Frequency of issues raised in submissions

The issues raised in each submission have been extracted and collated into categories, and corresponding responses to the issues have been provided. Refer to Chapter 4, 5 and 6 of this submissions report for the detailed responses to each submission.

A submissions register is provided in Appendix A of this report. The register identifies the submitter's unique ID number and where in this report the issue/s raised in their submissions are addressed.

3. Actions taken since exhibition

3.1 Further engagement activities

Since EIS exhibition, EnergyCo, its service provider Akaysha Energy and the site owner GPM have continued to meet with key stakeholders to progress the project or in relation to issues made in submissions. This includes in relation to traffic and transport, bushfire and hazards and other site-based matters. Correspondence and/or meetings with the following organisations have been undertaken since EIS exhibition:

– DPE – Hazards branch
– DPE – BCD
– NSW Fire+Rescue
– Transport for NSW
– Subsidence Advisory NSW.

Additionally, general co-ordination and consultation has also been ongoing with the DPE Assessments team regarding the application.

3.2 Additional assessment

3.2.1 Revised preliminary hazard assessment

A revised preliminary hazard assessment (PHA) has been conducted in response to queries provided by DPE – Hazards team on the PHA included in the EIS. In particular, the Department sought clarification that the total number of battery units required for the Waratah Super Battery could fit within the site area and achieve the minimum battery spacing recommended by the supplier and consistent with international fire safety guidelines to achieve the risk criteria set out in Hazardous Industry Planning Advisory Paper No 4 (HIPAP 4) and associated guidelines.

To support the revised PHA, Akaysha Energy provided a revised site layout plan based on manufacturer details of the minimum acceptable spacing between battery units. The adopted spacing of battery units complies with the manufacturers requirements and various international guidelines including the National Fire Protection Association (NFPA) 855: Standard for the Installation of Stationary Energy Storage Systems, UL Solutions 9540 Standard for Safety of Energy Storage Systems and Equipment and International Fire Code 2021.

Additionally, Akaysha Energy also provided details of the fire testing conducted on the battery units. The fire testing results indicated the required temperature to initiate a thermal runaway event (fire) and the heat radiated from a potential battery fire which allowed the determination of the minimum acceptable spacing between the battery units. This information was used to update relevant sections of the PHA.

The revised PHA is provided in Appendix D and confirms that the proposed number of batteries required for the Waratah Super Battery can be contained within the site area. As shown on Figure 4.1 in Appendix D, there are a relatively small number of battery units which partially encroach into the 25 metre APZ on the south-eastern and south-western sides of the site. Consistent with Section 6.10 of the EIS (and mitigation measure BR1), these units would only be developed once the service provider is able to demonstrate, in consultation with RFS, that a smaller APZ would achieve the individual performance criteria. In this regard, Akaysha Energy is confident that, based on its fire performance testing to date, a smaller APZ would achieve the performance-based criteria and meet the aims and objectives of the RFS *Planning for Bushfire Protection* guidelines.

The revised PHA concludes that the revised site layout allows suitable separation for battery modules to manage the thermal runaway fire propagation risk so far as reasonably practicable. The frequency of a fatality or injury is considered negligible for offsite locations and negligible for onsite locations. Therefore the project complies with the individual fatality and injury risk criteria specified in the NSW Department of Planning and Environment's 2011 publication *HIPAP No. 4 – Risk Criteria for Land Use Safety Planning*.

3.2.2 Results of additional biodiversity surveys and offset credit calculations

Section 6.2.10 of the EIS committed to conducting further surveys in the appropriate season to confirm presence or absence of some species assumed to be present in the EIS and to verify the impacts of the project, particularly the quantum of offsets that would be required based on the outcomes of the additional surveys.

Two additional targeted flora surveys were undertaken on 22 November 2022 and 22 December 2022 to investigate those species that could not be positively identified during the previous field surveys due to seasonal and weather considerations, flowering periods etc. In particular, *Corunastylis* sp. Charmhaven (NSW896673) was known to be flower (per. comm. Dannielle Allen – Central Coast Council – 15 December 2022). The surveys undertaken were transects with 5–10 metre spacing across all patches of native vegetation within the project site. These additional field surveys targeted the following threatened flora species:

– *Asperula asthenes* (Trailing Woodruff) – surveyed in November and December
– *Callistemon linearifolius* (Netted Bottle Brush) – surveyed in November
– *Corunastylis* sp. Charmhaven (NSW896673) – surveyed in November and December
– *Cryptostylis hunteriana* (Leafless Tongue Orchid) – surveyed in November and December
– *Maundia triglochinoides* – surveyed in November and December
– *Persicaria elatior* (Tall Knotweed) – surveyed in December.

None of the above listed threatened flora species were detected within the project site during the additional field surveys. As such, these species have been removed from the BAM-C credit calculations for the candidate threatened species (Species credits) section of the offsets calculator.

The updated credit reports that reflect these changes are provided in Appendix C and summarised in Table 3.1.

Table 3.1 Revised summary of ecosystem credits required

Plant Community Type/ species	No. of credits required (November 2022)	No. of credits required (January 2022)
1636-Scribbly Gum – Red Bloodwood – *Angophora inopina* heathy woodland on lowlands of the Central Coast	4	4
1724-Broad-leaved Paperbark – Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	3	3
Angophora inopina / Charmhaven Apple	4	4
Asperula asthenes / Trailing Woodruff	7	0
Callistemon linearifolius / Netted Bottle Brush	8	0
Cercartetus nanus / Eastern Pygmy-possum	4	4
Chalinolobus dwyeri / Large-eared Pied Bat	11	11
Corunastylis sp. Charmhaven (NSW896673)	7	0
Crinia tinnula / Wallum Froglet	5	5
Cryptostylis hunteriana / Leafless Tongue Orchid	3	0
Heleioporus australiacus / Giant Burrowing Frog	3	3
Hoplocephalus bitorquatus / Pale-headed Snake	7	7
Litoria aurea / Green and Golden Bell Frog	7	7
Litoria brevipalmata / Green-thighed Frog	5	5
Maundia triglochinoides	3	0
Persicaria elatior / Tall Knotweed	3	0
Petaurus norfolcensis / Squirrel Glider	7	7
Phascogale tapoatafa / Brush-tailed Phascogale	7	7

Plant Community Type/ species	No. of credits required (November 2022)	No. of credits required (January 2022)
Planigale aculate / Common Planigale	7	7
Uperoleia mahonyi / Mahony's Toadlet	7	7
Total credits required	**112**	**81**

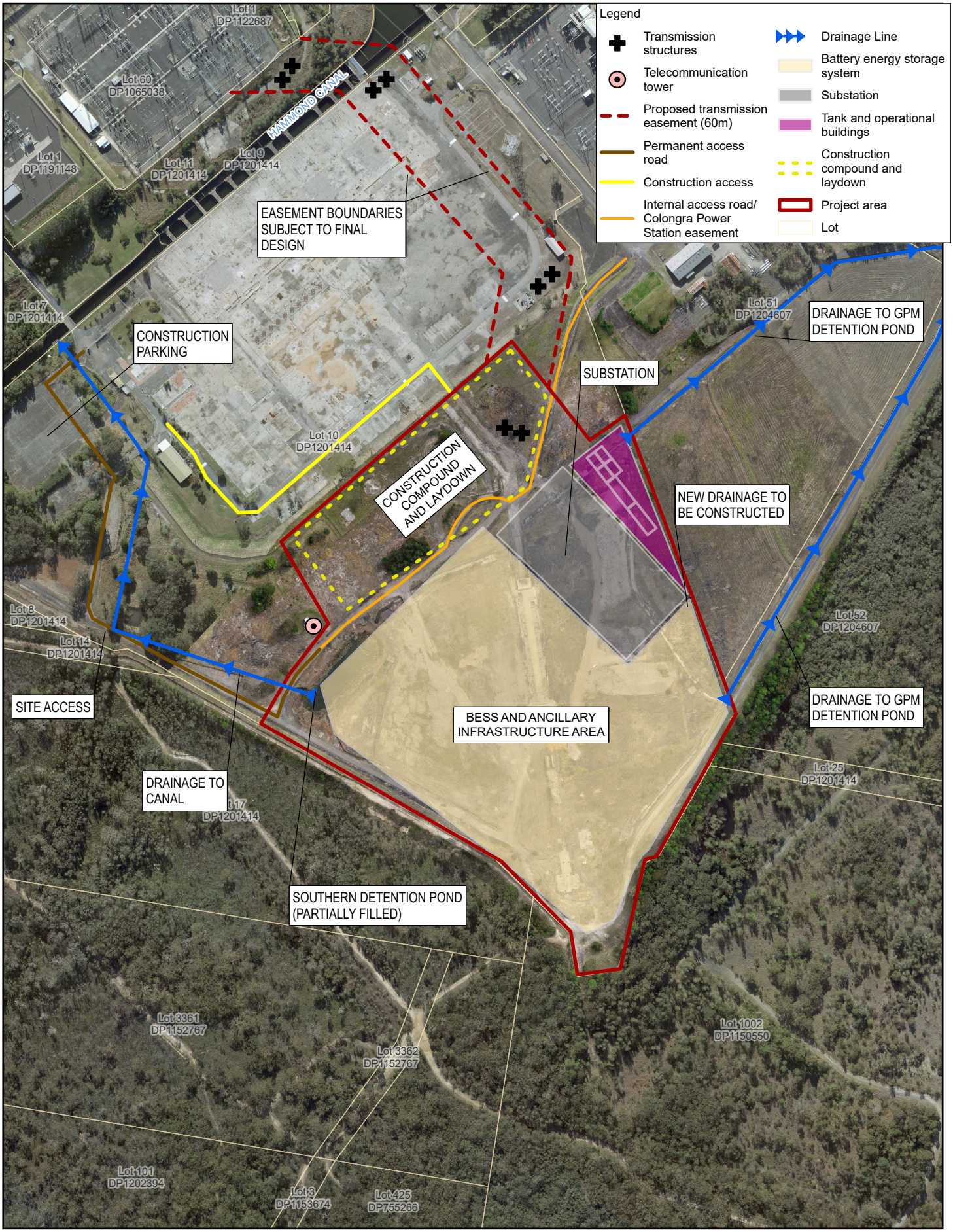
3.3 Project refinements

In mid-October 2022, EnergyCo appointed a consortium led by Akaysha Energy to develop the Waratah Super Battery following a competitive procurement process commenced earlier in 2022.

Since their appointment, Akaysha Energy have commenced engineering investigations and a detailed site layout and facility design as well as selection of preferred technologies and equipment. While the process of detailed design is continuing, investigations to date have led to identification of a small number of project refinements. The proposed project refinements are minor in nature and would not result in additional environmental impacts beyond those documented in the EIS. They would however align the EIS documentation more closely with the facility design more closely. The proposed project refinements are summarised below and shown on Figure 3.1 with the key changes being:

1. Relocation of the operations and maintenance buildings and storage tanks to the north-western side of the site in the area previously proposed to be occupied by the proposed oil-water separation pond.
2. Replacement of the oil-water separation pond with appropriately bunded main power transformers and oil-water separators. The batteries will not be bunded.
3. Extending the battery storage area slightly to the north including over most of the existing Southern Detention Pond to create a slightly larger and more uniform area for the battery arrays. Remediation of the detention pond would be undertaken by GPM as part of its overall site rehabilitation works (under separate approval as outlined in Section 1.4.2 of the EIS).
4. Site security will be maintained through use of appropriate fencing, access control measures and CCTV. A security gatehouse and bollards will not be used.
5. The transmission line easement has been adjusted slightly with transmission line supports comprising 8 no. dual poles with spacing ranging between 100 to 200 metres as shown on Figure 3.1.

The updated PHA (refer Section to 3.2.1 and Appendix D) demonstrates compliance with the Hazardous Industry Planning Advisory Paper No 4 (HIPAP) (Department of Planning 2011a) risk criteria and the frequency of a fatality or injury negligible for both onsite and offsite locations. The updated PHA has taken into consideration that the battery energy storage area no longer includes a gas or water fire suppression system and the separation distances between individual battery units spaced in accordance with the requirements of UL 9540.



Paper Size ISO A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

EnergyCo
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Response to Submissions Report

Project No. **12582669**
Revision No. **0**
Date **25-Jan-23**

Revised site layout plan

FIGURE 3.1

4. Response to NSW Government agency submissions

4.1 Crown Lands

Issue:

As no Crown land, roads or waterways are affected by the proposal, Crown Lands has no comments at this time.

Response:

The submission from Crown Lands is noted.

4.2 Regional NSW

Issue:

The Department agrees with the assessment of strategic importance for the project documented in Section 2 (Strategic Context) in the EIS.

In particular, the EIS identifies that the project will contribute to delivering the Central Coast and Lake Macquarie Regional Economic Development Strategy (REDS) 2018-2022 by recognising an opportunity for using old electricity infrastructure to support renewable energy businesses. This was identified as an initiative within the Regional Action Plan of the REDS (Section 9.1, Page 66).

Furthermore, the REDS 2022 Update for the Central Coast and Lake Macquarie (in draft following consultation with key stakeholders with publication imminent) bolsters the alignment of this project, identifying the recently declared Hunter/ Central Coast Renewable Energy Zone and its role as a refocus of priorities for economic development in the Region through the utilisation of the Regions existing infrastructure endowments.

Accordingly, the Waratah Super Battery Energy Storage System has the potential to contribute to the delivery of the REDS, providing growth in the local region, which will support ongoing employment for people in the region.

Response:

The submission from the Department of Regional NSW is noted.

At the time of writing, the REDS 2022 update mentioned above had not been published.

4.3 Environment Protection Authority

Issue:

The NSW Environment Protection Authority (EPA) has reviewed the EIS and notes that the project does not appear to require an environment protection licence under the *Protection of the Environment Operations Act 1997*. The EPA will therefore not have an ongoing role in licensing the facility, if approved.

The EPA notes that the EIS states that the key environmental impacts from the project can be managed through the mitigation options presented in the EIS and by issue-specific environmental subplans. Accordingly, the EPA does not object to the project and has not attached any recommended conditions.

Response:

The submission from the EPA is noted. EnergyCo is committed to implementing best practice in the construction and operation of the project, including the updated mitigation measures (contained in Appendix B) along with any conditions of approval for the project.

4.4 Heritage NSW

Issue:

Heritage NSW notes that the Aboriginal Heritage Assessment has been prepared in reference to the relevant Heritage NSW guidelines as required by the Secretary's Environmental Assessment Requirements (SEARs). Based on the assessment provided, Heritage NSW has no additional comments with respect to the proposed development proceeding. Heritage NSW does not require any further agency consultation in relation to this project.

Response:

The submission from Heritage NSW is noted.

The proposed mitigation measures contain protocols in case of unexpected finds during construction or operation of the project. Should any unexpected finds be discovered, EnergyCo will undertake consultation with the relevant heritage agencies in accordance with the agreed protocols.

4.5 Department of Planning and Environment - Biodiversity and Conservation Division

Issue:

The Biodiversity Development Assessment Report (BDAR) contained in Appendix D of the EIS identifies mitigative, management and offset measures that should be conditioned as part of any development approval. This includes management of construction impacts and obligations to retire biodiversity credits.

BCD recommend that the mitigation, management, and offset measures identified in the BDAR are conditioned to the project approval.

Response:

The response from BCD is noted.

As outlined in Section 3.2.2 of this report, additional surveys were undertaken at the site in late 2022 to confirm the presence or absence of species assumed present and included in the offset calculations documented in the exhibited EIS. Details of the additional surveys undertaken are provided in Section 3.2.2.

None of the target species were identified during the additional surveys. The offset calculations from the BAM-C calculator have subsequently been revised and are provided in Appendix C of this report and should form part of any consent issued for the project.

4.6 Fire and Rescue NSW

Issue:

It has been the experience of Fire and Rescue NSW (FRNSW) that Battery Energy Storage System (BESS) facilities pose special problems of firefighting and special hazards exist that may require additional fire safety and management measures. Due to these unique challenges, FRNSW make the following recommendations:

1. That a comprehensive Fire Safety Study (FSS) is developed. The FSS is to be developed in accordance with the requirements of HIPAP No.2 (Department of Planning 2011b) and is to meet the operational requirements of FRNSW.
2. That the development of the FSS consider the operational capability of local fire agencies and the need for the facility to achieve an adequate level of on-site fire and life safety independence. The FSS should consider worst-case fire scenarios including a full BESS unit fire and demonstrate no fire propagation within the facility.
3. That the FSS be submitted, reviewed, and meet the operational requirements of FRNSW prior to any further submission being made to FRNSW; this includes: an Initial Fire Safety Report and/or Performance-Based Design Brief / Fire Engineering Brief Questionnaire.
4. That the development of a FSS be a condition of consent.

5. That a comprehensive Emergency Response Plan (ERP) is developed for the site in accordance with HIPAP No.12. The findings of the FSS should inform the development and content of the ERP.
6. That an Emergency Services Information Package be prepared in accordance with FRNSW fire safety guideline – Emergency services information package and tactical fire plans.
7. The ESIP is developed for the site in consultation with, and to the satisfaction of FRNSW prior to commissioning of the site. The package should inform first responders of site-specific features and safety measures to ensure they are able to undertake their duties effectively in accordance with agency specific Standard Operational Guidelines. The format of the Induction Package should be such that it can be readily shared across all Agencies.

Response:

The submission from FRNSW is noted.

Mitigation measure HR4 commits to the completion of a FSS for the proposed facility, including consultation with the relevant fire authorities and reassessment of the risk of a thermal runaway event (fire) based on the preferred battery technology and installation recommendations of the supplier.

An updated assessment of the risk of a thermal runaway event occurring based on current preliminary design details is provided in Appendix D of this report.

4.7 Transport for NSW

Traffic Impact Assessment (TIA)

TfNSW comment	Response
A dedicated TIA does not appear to have been undertaken for this development. TfNSW does not consider Section (6.7) within in the EIS to be sufficient in addressing the full traffic impacts of the proposed development.	A traffic and transport assessment was undertaken and documented in Section 6.7 of the EIS. The assessment was prepared in accordance with the SEARs issued by the Secretary of the DPE on 14/10/2022, including the separate advice provided by TfNSW. The SEARs do not require a separate report be prepared to address Traffic (or any other) project issues; the assessments only need to address the SEARs and be sufficiently comprehensive to address the risks presented by the project. Typically, this is on the basis of an agreed worst case methodology being adopted and confidence the mitigation measures are likely to be effective in addressing the potential impacts and any residual risks identified. GHD are of the opinion that the assessment completed meets the requirements of the SEARs and is fit for purpose given the nature of the project, the proposed site (being the former site of the Munmorah Power station and currently the site of the Colongra power station) and its identified risks in relation to traffic and transport matters. Additional information provided to TfNSW during preparation of this Submissions Report is noted in the following responses. Based on the submission received from TfNSW and the meeting held with TfNSW on 16 January 2023, revisions have been made to a number of mitigation measures to address TfNSW's comments.
TfNSW key interests are the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with the Future Transport Strategy 2056.	Noted

TfNSW comment	Response
To ensure that TfNSW's key interests are addressed, TfNSW requests the application be updated with a supplementary TIA, prepared by a suitably qualified person/s in accordance with the Austroads Guide to Traffic Management Part 12, Australian Standards and any complementary TfNSW Supplements, and Roads and Maritime Guide to Traffic Generating Developments. The TIA is to directly address and include the information already addressed within Section 6.7 of the EIS (and updated where applicable) in addition to the following additional key information required to determine the proposed development's traffic impacts:	The transport assessment in Section 6.7 of the EIS was prepared by qualified traffic and transport specialists from GHD who are practiced in the preparation of traffic and transport assessments for other major infrastructure (SSI and CSSI) projects and in accordance with the SEARs issued by the Secretary of the DPE on 14 October 2022, including the separate advice provided by TfNSW. GHD confirms the listed documents were used as a guide to the content of Section 6.7 of the EIS as relevant, along with other relevant documents, standards and guides listed in Section 6.7.2.1. As a result, it is not considered that an additional assessment needs to be conducted.
Traffic volumes including: – Project-related traffic for each phase or stage of the project,	Section 6.7.4 of the EIS details the expected (worst case) vehicle activity likely to be associated with the construction, operation and decommissioning of the project. The traffic modelling/intersection analysis accounts for the expected peak demand associated with the construction of the project as the likely worst case of the above three project stages.
Traffic characteristics including: – Number and ratio of heavy vehicles to light vehicles, – Peak times for existing traffic, – Peak times for project-related traffic including commuter periods, – Proposed hours for transportation and haulage, – Interactions between existing and project-related traffic.	It is noted that: – Section 6.7.4.1.1 includes a summary of the expected light vehicle activity and Section 6.7.4.1.2 includes a summary of the expected heavy vehicle activity. – The analysis assumes 120 worker (light vehicle trips) and 20 heavy vehicle trips, corresponding to a ratio of 6:1. – Section 6.7.4.1.2 includes the expected trip generation associated with light and heavy vehicles. – Section 6.7.3.4 details the current road network peak times based on the conduct of a traffic survey – Section 6.7.4.1.2 specifies the hours of construction. Transport and haulage would typically take place between these hours, unless specific restrictions apply e.g., to oversize overmass (OSOM) loads, etc. – All background traffic activity is assumed to have been captured in the traffic surveys that were undertaken on 18 August 2022. The SIDRA analysis accounted for the additional construction-related traffic associated with the project.
Vehicle specifications: – Including OSOM, largest design vehicles for deliveries, transport vehicles for specialist equipment etc.	Section 3.2.4 details the types of heavy vehicle loads to be used during the construction of the project, including the expected OSOM loads. Akaysha Energy have reviewed the equipment required and have updated the number of OSOM loads up to 12 including for three transformers, three switch rooms, one control room and the transmission line support poles. Other construction vehicles and equipment, including transmission cable drums, batteries, etc would be delivered by low-loader or other semi-trailer vehicle to the site. Dimensions of the OSOM vehicles would be similar to vehicles that have accessed the Munmorah power station site in the past and would be confirmed following detailed construction planning which is ongoing. The origin of the equipment is anticipated to be the Port of Newcastle.

TfNSW comment	Response
The origins, destinations and routes for: – Commuter (employee and contractor) light vehicles and pool vehicles (including shuttle buses) – Heavy (haulage) vehicles, – OSOM vehicles including return routes for OSOMs. The TIA is to include details on the number of OSOM movements, intended time(s) for OSOM movements to occur and identify the location of pull-over bays / rest areas along OSOM routes where applicable.	It is noted that: – The EIS states that construction workers would most likely be sourced from either Sydney, Newcastle or the Central Coast. Regardless, vehicle trips were distributed in accordance with the patterns identified in the traffic surveys which is a conservative approach. – The light and heavy vehicle trip distribution assumptions, which were based upon existing traffic patterns, are included in Section 6.7.5. – The expected OSOM vehicle volumes (based on the available information) is provided in Section 3.2.4 and 6.7.4.1.4. As above, Akaysha Energy has confirmed that up to 12 OSOM loads are likely to be required with details to be provided following detailed construction planning which is currently ongoing. – The Pacific Highway and Scenic Drive from the Wyee Road intersection to the site is a designated OSOM and B-double route. – As detailed in 6.7.4.1.4, OSOM vehicles will use the designated routes approved by TfNSW for both inbound and outbound journeys. It is anticipated that the origin of OSOM loads would from the Port of Newcastle, however this will be confirmed following appointment of the construction contractor(s). A B-double designated route already exists from the Wyee Road intersection to the site. Given previous oversize vehicle movements to the site associated with the construction of the Colongra gas turbine facility and the demolition of the Munmorah power station, it is not anticipated that there will be significant impacts associated with the movement of OSOM vehicles that are required to support the construction of the project. – Identification of pull-over bays/rest areas would be part of detailed construction planning undertaken by the construction contractor(s) following award of the construction contract.
Road safety assessment of key haulage route/s: – Where road safety concerns are identified at a specific location along the proposed haulage routes and workforce commuter routes, the TIA is to be supported by a targeted Road Safety Audit undertaken by suitably qualified persons in accordance with the *Austroads Guidelines,* including proposing mitigation measures to manage any identified impacts.	As noted above, the proposed haulage route to be used is a designated B-double route to the site and the point of origin for heavy equipment/loads is likely to be the Port the Newcastle. No road safety concerns were identified during the assessment conducted for the EIS and it would be more appropriate for this to be undertaken during the detailed design stage and prior to construction following confirmation of details of routes to be used, timing of movements and types of vehicles to be used. As above, given it is likely that the routes to be used to the site are designated B-double routes, and they have been previously used for construction of Colongra power station and more recently the demolition of Munmorah power station, the provision of a Road Safety Audit is not considered necessary as part of the EIS.
A review of crash data along the identified transport route/s for the most recent 5 year reporting period and a road safety assessment along the proposed transport route/s considering safe systems principles adopted under Future Transport 2056 – further details are required, including a map clearly showing the relevant crash locations and relevancy to the data provided.	A review of crash data between 2016-2020 is outlined in Section 6.7.3.3 of the EIS. A figure showing the location of the crash data between Pacific Highway and Station Road was provided to TfNSW following the meeting on 16 January 2023.

TfNSW comment	Response
Controls for transport and use of any dangerous goods in accordance with State Environmental Planning Policy (SEPP) No. 33 – Hazardous and Offensive Development, the Australian Dangerous Goods Code and AS4452 Storage and Handling of Toxic Substances.	A screening assessment of dangerous goods quantities against the criteria in the State Environment Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) provided in Section 6.9.4.1 of the EIS determined that none of the thresholds in the SEPP would be exceeded during the construction of the project. As there would be limited movement, storage and use of hazardous goods and chemicals associated with the construction of the project, no mitigation measures are considered necessary.

Construction timeframes

TfNSW comment	Responses
The proposed construction timeframes are not clearly explained. 18 months is often used, throughout the EIS, with context to the entire (850MW) construction timeframe. However, it is understood the 18 month construction timeframe relates to construction of the first stage (350MW) only, which is expected to commence June 2023 and be completed by November 2024. Section 3.5, states construction will occur longer than 18 months (18-24 months), and further specifies the additional 500MW is estimated to be installed by March 2025.	Table 3.1 indicates that the indicative construction period would be approximately 18 months and Section 3.2.2.3 states that this would be followed by a 3-6 month period of commissioning and testing. While Section 3.2.7 indicates that the project may be constructed in stages, EnergyCo confirm that all key project components including all 850MW of batteries, are expected to be delivered, constructed, and installed within the 18 month construction period. Only the commissioning of the project may be staged such that an initial tranche of batteries would be completed earlier in the construction period with the residual commissioned over a subsequent period. The vast majority of construction vehicle activity detailed in the EIS will occur in the nominated 18 month construction period (and likely over a shorter period of about 10 months) which aligns with the duration of the key civil works of the battery component of the project.
Given the total 24 months is referenced once only throughout the EIS, and not within context of the traffic assessment, clarification is required to determine if all relevant assessments within the application are based on the initial 18 months only or the full 24 months, in particular the workforce volumes and the forecasted traffic impacts of the development extending beyond the 18 months period. This should include any concurrent workforce & deliveries for stage 1 testing / operational preparations & stage 2 construction activities. Further to this, the peak construction period within the total construction timeframes has not been identified and should be included in a future TIA.	As detailed in Section 6.7.6.1.4, SIDRA analysis was undertaken for the 2024 construction year and adopted a 1.5 per cent annual growth rate to traffic on Wyee Road, Station Road, Pacific Highway and Scenic Drive. Irrespective of the above clarification regarding the staged commissioning period of the project, the traffic impact assessment has assessed the worst case period for construction and no changes to the impact assessment findings would result. Therefore no updates to the assessment are considered necessary.

Pacific Highway/Wyee Road/Scenic Drive intersection

TfNSW Comment	Responses
This existing key intersection is clearly demonstrated in the EIS and SIDRA Outputs (Appendix I) to be under strain or nearing capacity during the peak hours. Additionally, the construction traffic of the development is demonstrated to place the intersection under further strain. No mitigation measures have been provided to directly address this traffic impact. It is noted`: – Construction workforce is stated to be likely based on the Central Coast or in Sydney or Newcastle and has the potential to access the site from all directions, including through this key intersection. – Accommodation strategy is proposed as part of Mitigation Measure SE3, however the location of any future accommodation and / or associated transport needs is not clear. – Carpooling is loosely suggested in the EIS, but not expanded on other than to identify the "persons per vehicle" rate of 1.25 for light vehicles.	It is noted that: – SIDRA analysis based on traffic survey data and signal phasing informed by SCATS data indicates that the intersection of Pacific Highway/Scenic Drive/Wyee Road currently operates with a poor level of service and long delays during peak periods of road network activity. – The project 'build' scenario accounts for 150 construction workers, which is the maximum number of staff expected to be employed during the construction of the project. – SIDRA analysis was completed for the 2024 horizon year for the following scenarios: • A 'no-build' scenario, accounting for background traffic growth (assumed 1.5 per cent) and trips associated with other approved major developments • A 'build' scenario, accounting for the background traffic growth and the expected peak construction traffic associated with the project. – To support a conservative assessment, the analysis assumed that the road network peak hour and construction activity peak hour would coincide. However: • As detailed in Section 3.2.6, workers are expected to arrive at the project site prior to 7:00 am and depart after 6:00 pm (outside the road network peak periods) • As detailed in Section 6.7.3.4, the road network peak hour occurs between 7:30am-8:30am and 4:30 pm-5:30pm – Accordingly, the SIDRA outputs overstate the traffic impacts associated with the construction of the project. – The 2024 SIDRA analysis indicates that the intersection of the intersection of Pacific Highway/Scenic Drive/Wyee Road is expected to operate with a poor level of service for both the no and build scenarios. Further, the construction vehicle activity associated with the construction of the project does not significantly impact the peak hour performance of the intersection of Pacific Highway/Scenic Drive/Wyee Road. – Construction will occur over a relatively short period (approximately 18 months). During operation of the battery, approximately 10 to 15 full-time equivalent personnel are likely to be required to attend the project site on a regular. Typically, there would not be a requirement for heavy vehicles to regularly access the project site when the battery is operational. – The impacts of the vehicle activity associated with the operation of the project are expected to be negligible compared with the construction stage. – While the residential locations of the construction workforce is not confirmed, Section 6.7.5 assumes that vehicles will access/egress the project site via the intersection of the Pacific Highway in accordance with patterns of movement identified by the traffic surveys. – As the project site is located in an urban area, any accommodation strategy developed is unlikely to require onsite accommodation for workers and instead would be expected to encourage the employment of local workers. – The assumption of an average occupancy rate of 1.25 workers per vehicle is based upon similar types of studies completed by GHD. The difference in removing this assumption would be approximately 30 additional vehicles in the project peak period.

TfNSW Comment	Responses
Consideration needs to be given to further reducing the volume of light vehicles to site, by formally committing to, developing and implementing a carpooling or shuttle bus arrangement for the construction workforce arriving and departing the development site. Further details of this need to be addressed in a future TIA.	As detailed previously, the traffic modelling conducted for the assessment assumed carpooling of construction workers at a rate of 1.25 workers per vehicle. We agree that the provision of a shuttle bus service (or other car pooling arrangements) would further reduce the vehicle activity associated with the project. However as detailed in Section 6.7.6.1.4, the intersection of Pacific Highway/Scenic Drive/Wyee Road is expected to operate with a poor level of service both with and without the project in 2024 and the additional project-related traffic is not expected to significantly impact the operation of the intersection. As such, and given the ample parking available within the site, a shuttle bus arrangement for the project is not considered to be necessary or warranted. Notwithstanding, a mitigation measure encouraging the use of car pooling (or complementary measures) will be included as a mitigation measure in response to this concern.

SIDRA and directional traffic volumes

TfNSW Comment	Responses
Presents SIDRA outputs as extracts only, which are extremely small text, without relevant footnotes and does not include any intersection diagrams.	All SIDRA movement summary outputs are included in Appendix I of the EIS. Following the meeting on 16/1/2023, GHD provided the SIDRA models and intersection layouts to TfNSW.
The SIDRA traffic volumes do not appear to match those in the traffic distribution tables in the EIS (figures 6.21 & 6.23). It is unclear which is correct. This information needs to be updated.	GHD have undertaken a review of the traffic volumes displayed in Figure 6.22 and Figure 6.2.3 with the inputs to the SIDRA models, and the data in the SIDRA models is consistent. Further information is required from TfNSW about the source of the potential inconsistency observed.
The “build phase” in the SIDRA analysis is noted to be for the year, 2024. However, construction is noted to commence in 2023, with the end of the 18 month construction timeframe (stage 1 only) expected to be in 2024. The project is noted to extend further into 2025 during the construction of the final 500MW of the project. The traffic impacts of the development are likely to increase after stage 1 is complete, in order to accommodate the additional workforce undertaking testing and operational activities of stage 1, concurrent to the construction traffic of the remaining 500MW.	The SIDRA analysis was undertaken for the 2024 horizon year: – Based on an 18 month construction period. – Accounting for an assumed annual growth rate of 1.5 per cent – Accounting for the maximum construction worker vehicle demand (as per the SEARs requirement). As outlined earlier, only the commissioning phase would be staged, however this would not affect the identification of the worst case construction period or result in additional impacts not already identified in the EIS. No additional assessment is therefore considered necessary.
The SIDRA analysis, directional traffic diagrams and traffic assessments need to be updated to further address the potential additional traffic impacts of any additional workforce accessing / departing the site for testing and / or operational activities required for the first stage of development (initial 350MW) concurrent to the construction staff working on the remaining 500MW of the development. This traffic data needs to be included in a future TIA as supplementary Appendices, expanded on in detail.	As above, no further analysis is considered necessary as the EIS has identified and assessed the worst case traffic impacts of the project. During operation, the project is expected to employ between 10 to 15 staff, only who would access/egress the site over a 24 hour period. The traffic impacts associated with the operation of the project are therefore expected to be negligible. No additional assessment or information is therefore considered to be required.
Mitigation Measure, SE3 – refers to the development of an accommodation strategy to address the needs of non-resident workers. This information may impact the direction of travel of light vehicles to site and needs to be addressed further within a TIA to identify any relevant traffic impacts, in particular, at key intersections.	As the project site is located in an urban area, it is not proposed to provide onsite accommodation for workers. Any Accommodation Strategy would be expected to prioritise the employment of local residents.

Cumulative impacts

TfNSW comments	GHD responses
TfNSW understands Station Road provides access to the subject site and Colongra Power Station (both within the former Munmorah Power Station site), in addition to Koala Park, a venue open to the public.	Noted.
The traffic counts undertaken for the development are noted to be a one-day count on a Thursday only. It is unclear if the traffic counts collected, would have sufficiently captured any peak traffic activity generated by the Koala Park venue. Further investigations are required to determine the peak activity periods of that development and how such traffic may, in a worst-case scenario, impact the peak traffic movements of the proposed development at the key intersections, in particular, Scenic Drive / Station Road intersection.	It is noted that: – Peak construction activity is expected to occur in morning and afternoon periods on a weekday with only a half day on Saturday. – Traffic surveys on a typical workday are considered sufficient to support the assessment of the impacts of the project. – Koala Park comprises two tennis courts, an oval and a kiosk and is unlikely to be a major trip generator. – As with most recreation spaces, the peak activity associated with Koala Park is not expected to coincide with the peak periods of road network or project construction activity. – Any activity associated with Koala Park that does occur in the road network peak period would be captured by the traffic surveys and subsequent intersection modelling undertaken in the EIS. – SIDRA intersection modelling was undertaken for the existing situation and the 2024 horizon year at the intersection of Scenic Drive and Station Road. We therefore do not consider that additional analysis is warranted.

Mitigation measures

TfNSW comments	Responses
Mitigation Measure, T3 – refers to rectifying any road deposits caused by site vehicles, to maintain the safety of road users. It is unclear what the term “Road deposits” means and it is further unclear how this would be monitored and / or how any “road deposits” would be clearly identified as being a result of the site vehicles. These statements and proposals are to be clarified and expanded.	Road deposits refers to materials being transferred from haulage trucks onto the sealed road network. It would be evidenced visually by deposits of dirt and mud on the roadway leading away from site, as well as potential dusty conditions during dry weather and can be adequately managed by measures incorporated into the CEMP. Mitigation measure T3 has been amended to clarify the meaning of road deposits and that the measure would only apply to sealed roads leading from the site.

OSOM and largest design vehicle

TfNSW comments	Responses
Section 6.7.4.1.4 in the EIS states, that three transformers & two transmission supporting structures will be delivered to site via OSOM specialist vehicles, however, section 3.2.4 appears to indicate, many more components requiring OSOM transportation.	Up to 12 OSOM vehicles will be required during the construction of the project. All other equipment identified in Section 3.2.4 e.g. cable drum rolls, site sheds, construction machinery, etc., would be delivered to the site via low-leader or conventional semi-trailer and not require OSOM vehicles. The precise number of OSOM loads would be confirmed by the construction contractor following award following identified of preferred suppliers.
The EIS notes permits will be required (undertaken by a contractor) and raises the potential need for traffic control measures to accommodate these movements. Mitigation Measure NV2 (in Appendix C) – refers to the potential for noise impacts of out of scheduled hours activity for the delivery of “oversized plant of structures”.	Noise impacts are addressed in Section 6.6 of the EIS. There is a typo in the quoted mitigation measure, which should refer to “oversized plant or structures” Permits will be obtained as required for OSOM movements once details are confirmed by the appointed construction contractor. The scheduling of OSOM movements is not currently known, but efforts will be made to minimise noise impacts to adjoining areas during transportation. Any conditions of OSOM permits will be complied with.

TfNSW comments	Responses
Although the need for permits for the future OSOM movements across the state road network is acknowledged in the documentation, TfNSW notes, critical transportation information regarding the OSOM components and associated movements is still required and is essential during the development's assessment and approvals stage, to ensure all relevant factors impacting the state road network are sufficiently identified, addressed and mitigated early.	All movements of OSOM vehicles will comply with TfNSW and National Heavy Vehicle Regulator requirements. Approvals required will be obtained prior to the movement of OSOM vehicles to and from the project site once details of the timing, number of movements and routes are confirmed during detailed construction planning by the appointed construction contractor(s).
TfNSW require further information regarding: – all oversized components and specialist vehicles required for transportation, specifying the load and vehicle dimensions (height, width and mass). – the proposed transportation routes (beyond noting use of designated Heavy Vehicle Routes) from the points of origin to the development site. The identified route/s should clearly identify any pinch points, points of conflict and any road infrastructure (in particular bridges and culverts) along the route/s. – Swept path diagrams, demonstrating that all required design vehicles (Over Size Over Mass vehicles) will be able to safely and efficiently access the site, and no additional works will be required to accommodate those vehicles, in particular at the key classified road intersections. – Noise mitigation measures for any out of scheduled hours activity relating to OSOM deliveries.	As indicted above, it is noted that: – The OSOM load and vehicle dimension details are not currently available as are the end to end routes to be used. It is likely that the Port of Newcastle will be the point of origin. – Outputs from the TfNSW Restricted Access Vehicle map provided in Figure 6.18 of the EIS indicate 26-metre B-double routes on: • Pacific Highway (A43) • The Pacific Motorway (M1) • Scenic Drive between Pacific Highway and Station Road. – The roads in proximity to the site, including Pacific Highway and Scenic Drive are authorised by TfNSW to accommodate OSOM vehicles. As a result, it is not expected that the proposed OSOM vehicles would not be able to safely and efficiently access the site for the construction of the project. – As specified in mitigation measure NV3, a Construction Noise and Vibration Management sub plan will be prepared as part of the Construction Environmental Management Plan and implemented during construction. The plan will detail processes, responsibilities and measures to manage noise and vibration and minimise the potential for impacts, including for OSOM deliveries. Approvals required for the movement of OSOM vehicles will be obtained prior to movement. Any conditions of OSOM permits will also be complied with.

Construction Traffic Management Plan (CTMP)

TfNSW comments	Response
Further to the proposed inclusions in a CTMP (Mitigation Measure T1), the CTMP is to be prepared and implemented, in accordance with Australian Standard 1742.3 and the Work Health and Safety Regulation 2017 and in consultation with relevant Councils and TfNSW. The CTMP needs to identify strategies to manage the impacts of project related traffic.	The additional requirements for inclusion in the CTMP is noted. Mitigation measure T1 has been updated accordingly to include these requirements.

4.8 Geological Survey of NSW

Issue:

The Minerals and Exploration Group of Geological Survey of NSW has reviewed the EIS and notes the subject land is covered by Consolidated Coal Lease (CCL) 720 and CCL722 held by Centennial Munmorah Pty Ltd (Centennial). EnergyCo has consulted with Subsidence Advisory NSW who contacted the lease holder.

Centennial's advice is that future mining is unlikely. Accordingly, Geological Survey of NSW has no resource sterilisation concerns regarding the proposal.

Response:

The submission from Geological Survey of NSW is noted.

4.9 Subsidence Advisory NSW

Issue:

Subsidence Advisory acknowledges that previous consultation advice sought during the course of the EIS has been incorporated into the document.

It is noted that the EIS commits to ongoing consultation with the intention that proposed surface developments will be referred to Subsidence Advisory for approval. Section 6.4.5 of the EIS notes that further geotechnical testing and assessment of the abandoned workings will be undertaken to determine geotechnical requirements for design to ensure future surface development remains serviceable and readily repairable should a subsidence event occur.

Response:

Mitigation measure L2 provides for the ongoing management of possible subsidence during detailed design and construction of the proposal. Mitigation measure L2 requires the conduct of a mine subsidence assessment and further consultation with Subsidence Advisory NSW in relation to identified subsidence issues and risks of the proposal.

4.10 Department of Primary Industries – Fisheries

Issue:

DPI Fisheries has no objections or comments as there appears to be no proposed impacts on fish or fish habitat.

Response:

The submission from DPI Fisheries is noted.

4.11 Department of Planning and Environment – Water

Issue:

The Department has assessed the EIS and requests clarification on the water supply for the project, and that any works within waterfront land show due consideration to the *Guidelines for Controlled Activities on Waterfront Land*. Specifically, the proponent should provide clarification of the ability to obtain the necessary water volumes from the site or confirm a viable supply is available for the supply, via an indication of an agreement from a water supplier.

Additionally, works within waterfront land need to show due consideration of the *Guidelines for Controlled Activities on Waterfront Land*.

Response:

Section 6.8.4.1 of the EIS estimates that up to 30.5 ML of water would be required during the construction stage including for dust suppression/ compaction and for construction worker drinking water, crib rooms, toilets, etc. This estimate is dependant on weather conditions experienced as dry weather will require more water for dust suppression whereas wet weather will require less. The estimated figure of 30.5 ML is considered more representative of a high usage scenario i.e. dry weather forecast.

The primary water sources will be from existing dams on site e.g. for dust suppression/ compaction, but as there is also potable water available at the site, it may be used to provide the balance of construction water needs. The potable water source will be a metered connection to the local water authority.

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated use and management of water resources in NSW. The WM Act controls the extraction of water, its use, and the carrying out of activities on or near water sources to ensure that no more than minimal harm will be done to waterfront land. 'Waterfront land' includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

Notwithstanding that certain approvals under the WM Act are not required for project declared critical infrastructure, including for activities conducted on waterfront land, EnergyCo will apply the principles and precautions outlined in the *Guidelines for Controlled Activities on Waterfront Land* (NRAR, 2018) in the design and construction planning for the project.

Mitigation measure W3 has subsequently been updated to include specific reference to this document to ensure that no more than minimal harm will be done to waterfront land and that impacts to surface water quality are eliminated/reduced.

4.12 NSW Rural Fire Services

Issue:

The NSW RFS does not raise any objection to the proposed development subject to the following conditions:

1. Asset Protection Zones (APZ)

From the start of proposed works, the property around the proposed asset on the southern and western aspect must be managed as an inner protection area (IPA) for a distance of 25 metres in accordance with the requirements of Appendix 4 of *Planning for Bush Fire Protection 2019*. When establishing and maintaining an IPA, the following requirements apply:

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2 metres above the ground;
- tree canopies should be separated by 2 to 5 metres;
- preference should be given to smooth barked and evergreen trees;
- large discontinuities or gaps in vegetation should be provided to slow down or break the progress of fire towards buildings;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover;
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

2. Access – public roads

Access roads must comply with the general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

- traffic management devices are constructed to not prohibit access by emergency services vehicles;
- maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;
- all roads are through roads;
- dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;
- where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;
- one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression;
- the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles;
- bridges/causeways are to clearly indicate load rating;

– hydrants are provided in accordance with the relevant clauses of *AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning*; and
– there is suitable access for a Category 1 fire appliance to within 4 metre of the static water supply where no reticulated supply is available.

Perimeter roads must comply with the general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

– are two-way sealed roads;
– minimum 8 metre carriageway width kerb to kerb;
– parking is provided outside of the carriageway width;
– hydrants are located clear of parking areas;
– are through roads, and these are linked to the internal road system at an interval of no greater than 500 metres;
– curves of roads have a minimum inner radius of 6 metres;
– the maximum grade road is 15 degrees and average grade of not more than 10 degrees;
– the road crossfall does not exceed 3 degrees; and
– a minimum vertical clearance of 4 metre to any overhanging obstructions, including tree branches, is provided.

Non-perimeter roads must comply with the general requirements of Table 5.3b of *Planning for Bush Fire Protection 2019* and the following:

– minimum 5.5 metre carriageway width kerb to kerb;
– parking is provided outside of the carriageway width;
– hydrants are located clear of parking areas;
– roads are through roads, and these are linked to the internal road system at an interval of no greater than 500 metres;
– curves of roads have a minimum inner radius of 6 metres;
– the road crossfall does not exceed 3 degrees; and
– a minimum vertical clearance of 4 metre to any overhanging obstructions, including tree branches, is provided.

3. Water and utility services

Any new provisions of water, electricity and gas must comply with Table 5.3c of *Planning for Bush Fire Protection 2019.*

4. Emergency and evacuation

A Bush Fire Emergency Management and Evacuation Plan must be prepared and be consistent with the NSW RFS document: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*.

The Bush Fire Emergency Management and Operations Plan should identify all relevant risks and mitigation measures associated with the construction and operation of the proposed Waratah Super Battery Energy Storage System. This should include:

– detailed measures to prevent or mitigate fires igniting;
– work that should not be carried out during total fire bans;
– availability of fire-suppression equipment, access and water;
– storage and maintenance of fuels and other flammable materials;
– notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate; and
– appropriate bush fire emergency management planning.

Note: A copy of the Bush Fire Emergency Management and Evacuation Plan should be provided to the Local Emergency Management Committee for its information prior to occupation of the development.

5. General advice

It is advised that the buildings provide ember protection by enclosing all openings (excluding roof tile spaces) or covering openings with a non-corrosive metal screen mesh with a maximum aperture of 2mm. Where applicable, this includes any sub floor areas, openable windows, vents, weepholes and eaves. External doors are to be fitted with draft excluders.

Response:

The submission from NSW RFS is noted.

The details provided in the submission appear relevant to incorporate into the detailed design of the project and would be considered in addition to the information provided in Section 6.10.4.6 of the EIS (Recommended APZ, building design and construction, access arrangements, water supply and utilities and emergency management arrangements) and mitigation measures BR1, BR2 and BR3 of the EIS.

In relation to the APZ, as outlined in Section 6.10 of the EIS and mitigation measure BR1, a 25-metre APZ is proposed to be implemented along the western and southern sides of the project site *unless* a performance-based solution is able to adequately demonstrate that a smaller APZ would meet the aims and objectives of the *Planning for Bushfire Protection* guidelines. Akaysha Energy has updated the site layout based on further detailed design which includes a small number of battery units which partially encroach into the 25 metre APZ (refer Figure 4.1 of Appendix D). Consistent with mitigation measure BR1, these units would only be developed once Akaysha Energy is able to demonstrate, in consultation with RFS, that a smaller APZ would achieve the individual performance criteria. In this regard, Akaysha Energy is confident that, based on its fire performance testing to date, a smaller APZ would achieve the performance-based criteria and meet the aims and objectives of the *Planning for Bushfire Protection* guidelines. Nonetheless, provision has been made in these locations for fire barriers, which would be installed if required.

In relation to access roads, it is noted that Table 5.3b of the *Planning for Bushfire Protection* guidelines relates to residential and rural residential subdivisions and is therefore not directly applicable to industrial developments. While appropriate trafficable perimeter accessways will be provided, it is not proposed that these be sealed and be to residential standards. The final design of the site access roads will be provided in the Fire Safety Study (mitigation measure HR4) and Bushfire Emergency Management and Evacuation Plan (mitigation measure BR3) which would be prepared in consultation with NSW RFS.

4.13 Transgrid

Issue:

The Environmental Assessments team will need to carry out a due diligence review of the EIS to confirm that all necessary grid connection works are captured.

The Property team will also provide any relevant advice from Lumea to ensure all necessary grid connection tenure requirements are captured as part of the project.

No further comment from the Property team has been provided at this stage.

Response:

The submission from Transgrid is noted.

EnergyCo understands the need to co-ordinate the design of the transmission line connection to Munmorah substation and the importance of the grid connection being available in time for commissioning and testing in 2024. EnergyCo and its service provider Akaysha Energy are committed to ongoing engagement and dialogue with Transgrid via a connection agreement in accordance with the National Electricity Rules to ensure the overall development timetable is achieved.

5. Response to Central Coast Council

5.1 Traffic and transport

Issues raised:

– There should be a Construction Management Plan detailing but not limited to: type of vehicles, loads, frequency and duration of construction traffic
– The TIA was not available for review on the website despite being referenced in the EIS. Concern is raised in relation to the safe operation (capacity and safety) of the Central Coast Highway and access to the site, the ongoing operation of the site, parking on site, etc. Has the assessment had regard for the use of the recreation areas along the access road to the site? How construction and delivery vehicles will be managed on the road network? This should be developed in consultation with TfNSW and Council.
– Council, as the Roads Authority, requires finalisation of all traffic-related documentation prior to the commencement of any works on site.
– A Dilapidation report should be prepared prior to the commencement of any works on site.

Response:

Construction Management Plan

Section 7.2 of the EIS provides an outline of the environmental management strategy to be developed and implemented following any approval of the project. The strategy is summarised diagrammatically in Figure 7.1.

An overarching project environmental management strategy addressing the construction, operation and future decommissioning and rehabilitation stages of the project would be developed and implemented including a number of issue-specific subplans (including traffic). The general requirements and contents for each issue-specific sub-plan is summarised in Section 7.3.

Mitigation measure T1 outlines the requirement to develop a CTMP and the minimum requirements in addition to the information in Section 7.3. The information requested by Council would be included within the CTMP.

Traffic Impact Assessment

A TIA was included in Section 6.7 (page 105) of the EIS and was not a separate document. The scope of the traffic impact assessment was based upon the SEARs issued on 14 October 2022 which included advice from TfNSW. The SEARs requirements are provided in Appendix A of the EIS as well as on DPE's major projects portal.

The findings of the TIA was that, on the basis of conservative assumptions made regarding construction traffic volumes, the assumption that construction vehicle movements would occur at the same time as the road network peak; adoption of a 1.5 per cent annual traffic growth and the influence of other major projects which may also contribute to regional traffic flows, there would be no adverse impact on the safety or capacity of the road network following the implementation of the proposed mitigation measures. This includes the intersections of Scenic Drive/ Central Coast Highway and Wyee Road as well as Scenic Drive/ Station Road and the recreational area accessed from Station Road. In particular, the operation of the project would have a negligible impact. Crash data for the period 2016-2020 was reviewed as part of the assessment and did not identify any safety issues warranting additional assessment.

Details regarding the planned parking arrangements within the site, potential queuing areas for construction vehicles, movement of heavy vehicles and routes, etc are subject to detailed design and construction planning processes and would be developed following appointment of the construction contractor(s). However as indicated on Figure 3.4 of the EIS, there is ample parking and queuing space within the site such that no impacts on the local road network are expected. Further details of parking and queuing areas would be part of information to be included in the CTMP which would be developed in conjunction with TfNSW and Council.

The requirement for finalisation of all traffic-related documentation before works commencing onsite is noted.

Road condition report

The requirement for road condition reports to be undertaken and for the road owner to be compensated for degradation identified beyond normal wear and tear has been included in revised mitigation measure T1.

5.2 Water

Issues raised:

- The Water Impact Assessment has not looked at the stormwater runoff generated from the development site. Stormwater management should be above the Probable Maximum Flood (PMF) (and include a freeboard) having regard for runoff within the site's own and adjoining catchments, not purely the mainstream PMF of the Lakes and main watercourses.
- Stormwater quality in consideration of the importance of the receiving areas.
- Sanity checks should be considered in the stormwater modelling to ensure failure or risks are adequately managed.
- Landscaping plan showing revegetation more than stabilising grasses should be planted.
- Consultation with, and the obtaining of any water and sewer related approvals should occur as a matter of priority. A Section 305 application under the *Water Management Act 2000* should be submitted.

Response:

Site flooding and stormwater management

Information on the topography of the site and catchment hydrology including flooding susceptibility is provided in Section 2 of Appendix H (Water Impact Assessment) in relation to the existing environment and Section 5.1 in relation to potential impacts to and from the project.

The project site is located at an elevation of 10-15 metres AHD while the elevation of the Tuggerah Lakes system is generally much lower around 0.2-0.3 metres above sea level. Based on modelled flood levels (WMA Water, 2014), the design flood elevation in a PMF event is only 2.7 metres AHD relative to the site elevation of 10-15 metres AHD. The modelled PMF flood for the Tuggerah Lakes system by definition includes the adjacent catchments which contribute runoff. Runoff from the site itself is a very small component of the regional catchment and would not noticeably change the modelled flood levels under the PMF event.

As identified in Section 5.1.2 of Appendix H, considering conservative estimates of sea level rise and increasing intensity of rainfall in the future as a result of climate change, which could contribute up to another 2 metres of flood water levels at the site, the site would still be 5 metres or more above predicted downstream flood levels.

Runoff at the site is contained by a number of existing channels surrounding the site which drain into detention structures to the east and west of the project site before entering Hammond Canal or Lake Munmorah. Upgradient catchments are diverted around the power station site into Hammond Canal or Lake Munmorah.

As outlined in Section 5.1.1 of Appendix H, design of the proposed site stormwater drainage system would be undertaken during detailed design and would include utilising the existing drainage network to allow for separation of catchments and to ensure that clean water is directed away from any works areas or infrastructure. Design of the drainage network would consider final drainage channel alignments, sizing, and details of the perimeter drainage system to manage impacts associated with expected peak flows and in accordance with Council requirements. A commitment to undertake final drainage design in accordance with these principles is outlined in mitigation measure W1 which also includes investigation of opportunities for the stormwater management system to address water quality risks. The investigation of appropriately sized water quality controls would include MUSIC modelling as appropriate in order to achieve the water quality controls specified by Council. The detailed design of the stormwater drainage system, including water quality controls, would be undertaken in conjunction with Council.

Site landscaping

The request for a landscaping plan involving revegetation with more than stabilising grasses is not appropriate for the site in view of the nature of the bushfire risk and the need to manage fuel load at the site. The site would also not be visible from the public domain. There is therefore no proposal for broader scale revegetation beyond the use of stabilising grasses and perhaps very small areas of amenity plantings around offices.

Section 305 application under the Water Management Act

EnergyCo notes the request for applications under Section 305 of the WM Act to be prioritised. Section 305 relates to a certificate of compliance for development. EnergyCo and/or its service provider will contact Council to understand the information requirements to obtain Council approval for the On-site Sewage Management System (OSMS).

5.3 Visual

Issue raised:

– Reflectivity of the battery should be considered, particularly in relation to nearby residences, aircraft, development on the opposite side of the lake etc.

Response:

The potential visual impacts of the proposal on surrounding areas (particularly during operation) were assessed and are documented in Section 6.5 of the EIS.

There are large tracts of contiguous trees and mature vegetation immediately surrounding the project site including at Colongra Swamp as well as undeveloped, vegetated coastal sand dunes that visually isolate the project site from the surrounding existing suburban areas of Doyalson to the north, San Remo to the west, Buff Point to the south and Halekulani to the east. The nearest residential areas are located approximately 600 metres to the southeast.

Figure 6.8 in the EIS shows the zone of theoretical visibility of the proposed infrastructure at the project site, including the battery containers in the BESS area and the three transmission support structures. As shown in the figure, the vast majority of views to these elements at or near ground level are contained within the broader Munmorah Power station site, surrounding the proposed Waratah Super Battery site.

While reflectivity of the battery arrays is not specifically considered, the visual assessment confirms that the batteries are unlikely to be visible from surrounding areas, due to their relatively low height from the ground, intervening vegetation and little to no difference in elevation between the site and the receivers.

Five viewpoints surrounding the site were selected and assessed as part of the detailed visual analysis. The assessment concluded that the visual impacts from these five locations is negligible. Views from more distant areas, including development areas on the other side of the lake, are therefore less likely, if visible at all.

A glint and glare assessment of the project was not required to be undertaken as part of the environmental assessment requirements issued by the SEARs and is not considered to be warranted for this proposal. The surface coating of the metal battery enclosures is likely to be comparable to that of Colourbond roofs of buildings in the surrounding suburbs and thereby unlikely to contribute unusual or unexpected “glint” which may be a distraction to pilots.

5.4 Noise

Issue raised:

– Ensure the acoustic report adequately addresses the ongoing operation and contains realistic and achievable mitigation measures

Response:

A noise and vibration assessment for the proposal was undertaken and included in Section 6.6 of the EIS with further details in Appendix G. The operational assessment comprised noise modelling of the potential noise sources combined with field surveys to establish baseline noise conditions at two representative residential receiver locations; one to the south and one to the west of the site.

The modelling of operational noise included a number of conservative assumptions/ methods to ensure that the noise level predictions were unlikely to be exceeded and noise emissions would achieve the regulatory criteria at sensitive receivers. This included adopting conservative sound power levels, assuming temperature inversion conditions exist even during higher ambient temperature periods (e.g., summer months when inversions are less likely to occur) and modelling a range of ambient high air temperature conditions e.g., 35 degrees and above which would affect the transmission of noise emissions into surrounding areas.

The noise modelling results indicate compliance with the regulatory criteria is predicted at all sensitive receiver locations for all modelled operational scenarios during the daytime and evening periods. Although the possibility of an exceedance occurring during the night-time period under extreme ambient conditions i.e., above 35 °C was identified, the 5-year temperature history at Norah Head Automatic Weather Station closest to the site indicates that this scenario has never occurred at night. As such no significant impacts are expected to occur.

Mitigation measure NV5 and NV7 require the selection of plant and layout of the site to ensure the emissions of noise are not greater than those included in the EIS assessment such that noise emissions do not exceed regulatory criteria at any sensitive receivers.

5.5 Biodiversity and bushfire

Issues raised:

– Ensure there is consistency between the bushfire report and the BDAR. In this regard, the BDAR should consider all vegetation proposed to be removed for APZ's and any proposed transmission line routes/associated infrastructure.
– The bushfire report should have regard for future landscaping/plantings within constructed wetlands or for the stabilisation of disturbed areas.
– It is noted additional (biodiversity) surveys were to be undertaken in the appropriate season in 2022. If these have been received they should be made available on the Portal for review by Government Authorities and the community.

Response:

The biodiversity assessment in Section 6.2 of the EIS and the Biodiversity Development Assessment Report (Appendix D of the EIS) included the vegetation needing to be cleared for the whole development including the bushfire asset protection zone. There was a typographical error in Section 6.2 of the EIS which did not correctly identify the total amount of native vegetation proposed to be cleared. The total area of vegetation impacted is 0.26 ha as stated in the Biodiversity Development Assessment Report (Appendix D of the EIS). As indicated in Section 3.2.2 of this submissions report, the BAM-C credit calculations have been updated to take account of additional surveys conducted. Revised credit calculations are provided in Appendix C of this submissions report.

The final design of site/ network drainage and water quality control devices has not yet been confirmed. Mitigation measure W1 commits to preparing a study of site hydrology and drainage requirements, which will include as necessary modelling of pollutant loads and the necessary water quality controls to target achievement of Council's water quality targets. The assessment in the EIS and mitigation measure W1 notes that there may be opportunities for a dual-use drainage system which also includes water quality controls, subject to the study findings. This may also include consideration of constructed wetlands. Owing to the bushfire risk of the site and the need to actively manage the on-site fuel load, it is not intended that vegetated plantings, other than grasses, would be provided for land stabilisation or other purposes. This would include within constructed wetlands, should they be proposed.

Two rounds of additional ecological surveys were undertaken during November 2022 and December 2022 which targeted six species which were not able to be surveyed during the period of the original BDAR. Details of the survey methods used and the survey findings are provided in Section 3.2.2 of this report. On completion, this report will be published on the DPE's major project website and available to Government agencies and the community.

6. Response to community and stakeholder submissions

6.1 Support

Submission ID SE-51020459, Name withheld, Walcha

Issue raised:

I fully support the Waratah Super Battery storage project. This project is critical to ensuring NSW continues to have a reliable energy supply.

Response:

The support for the project is noted.

6.2 Design of the project

Submission ID SE-51732458, Quentin Reynolds, East Gosford

Issue raised:

The project includes 160 solar panels. However you could add more panels on top of each of the 2600 battery modules as well and align the modules east/west to maximise solar radiation. It would be preferable to incur some minor additional cost now than and include solar panels at this stage than to undertake a more expensive retrofit later. Perhaps the whole area could be covered with solar panels as has been done over some car-parks.

Response:

The project involves the development of a SIPS control and standby network battery system dedicated to supporting the transmission grid. The battery component of the project is part of the SIPS and is designed primarily to provide reserve transmission capacity and stability, rather than additional electricity storage capacity.

No solar panels are included in the project. Table 6.72 of the EIS notes roof mounted solar PV on the operations and maintenance building would be considered as a 'stretch initiative' that could potentially be adopted for additional sustainability benefits, however access requirements for maintenance would not allow the project to be covered. Section 3.3.1 of the EIS outlines the concept of 'paired generation' (subject to separate approvals where required) which would include renewable power generation operating in conjunction with the Waratah Super Battery.

6.3 Impacts of the project

Submission ID SE-51949462, Name withheld, Buff Point

Issue raised:

The submitter raised concerns regarding EMF, operational noise, risk of fire and to the surrounding environment, consultation and property values and health. They also queried the benefits of the project and whether the benefits would be shared with local landowners. Specific requests and concerns include:

– EMF – have the risks also been combined with future EMF generating infrastructure? There is very little information on how this will affect the community and the risk assessment is very vague. Will EMFs reach surrounding suburbs?
– Operational noise – Will residents hear noise from the site during the day and at night? This end of the coast is very quiet especially at night. How will local fauna be affected from this development? Will their breeding, foraging and nesting be affected?
– Engagement – more consultation needs to take place as most people are unaware of this project. The 1600 letters that were sent out isn't enough. I didn't receive one and I'm a homeowner and ratepayer close to the proposed site.

– Property values and public health – How will the project affect property values and more importantly our health?
– Local benefits – There is no benefit for the local community. Will we be supplied with cheaper energy? Or will the community be upgraded with something they can benefit from? Something of this scale makes the community deserving of some reimbursement.
– Hazard and risk – The area is very environmentally fragile and it concerns me that something could go wrong like a chemical leak or a fire like the battery system in Victoria.

Response:

– A PHA was undertaken for the EIS which identified sources of EMF associated with the project during operations would be from the onsite transformer yard and two 330kV transmission lines between the transformer yard and Munmorah substation. EMF exposure levels at the boundary of the transformer yard are anticipated to be similar to existing background levels as a result of careful positioning and selection of equipment. Additionally, the switchyard and project site would be fenced to prevent members of the public from entering the transformer yard and ensure a negligible exposure risk. The transmission lines do not extend outside the project site and do not enter any residential areas, however EMF from transmission lines would be well below the ICNIRP *Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields (1hz – 100khz)* (International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2010) guidelines on limits of exposure and no significant impacts from EMF exposure is anticipated.

  It is not possible to include future infrastructure projects into the project's PHA as potential future projects and their EMF levels are unknown. As the transformer yard would be fenced and the transmission lines do not extend past the project site boundary, EMFs would not reach surrounding suburbs.
– A noise and vibration assessment was undertaken for the EIS which included an operational noise assessment. Noise modelling was undertaken on worst-case operating conditions to predict noise levels during operations based on four scenarios. Modelling indicates operational noise would achieve compliance during the day and evenings. Compliance is also expected during the night time period, however some exceedances under extreme night temperatures above 35°C could occur. Recent temperature history indicates night time temperatures has never reached a maximum of 35°C, and as such no significant noise impacts are anticipated.

  Mitigation measures provided in Appendix C of the EIS will ensure any potential noise impacts are kept to a minimum. This includes operational noise monitoring being undertaken at commissioning and/or following the commencement of operations.
– Engagement for the project was undertaken in accordance with the Waratah Super Battery – Munmorah Community and Stakeholder Engagement Plan, and with reference to the Department's *Undertaking Engagement: Guidelines for State Significant Projects* and the International Association for Public Participation guidelines. Chapter 5 of the EIS outlines the community consultation that has been undertaken during the development of the project. This includes a project website, newsletter which was published on the project website and provided during letter box drops to approximately 2,700 residents and businesses surrounding the project site, various EnergyCo media releases and editorials in newspapers and an enquiry line for phone calls and emails. Community engagement will continue throughout the construction, operation and decommissioning and rehabilitation stages of the project. Given this it is considered that the degree of community consultation undertaken was appropriate.
– Social and economic considerations of the project are detailed in section 6.11 of the EIS. The project is located within Colongra which has no residential areas. Additionally, the project is located within the former Munmorah Power Station and adjacent to the existing Colongra Power Station and will re-use old electricity infrastructure within an industrial area. The nearest residential areas to the project site are about 600 metres away within the suburb of Halekulani. It is not anticipated that the project would have any significant impact to property values given the distance to residential areas and the re-use of an existing electricity infrastructure site.

  During construction of the project, temporary changes to local amenity (i.e. increased noise and dust) could occur at the site, however nearby residential areas in Halekulani are separated from the project site by a large vegetated buffer which will reduce potential impacts. Mitigation measures proposed in the EIS will minimise and manage these and other identified impacts. The project is not anticipated to impact on community member's health.

– The project will contribute to delivering economic benefits at both the state and regional level. The project would contribute to delivering the *Central Coast and Lake Macquarie Regional Economic Development Strategy 2018 – 2022* as an opportunity to re-use old electricity infrastructure to support renewable energy businesses (refer to section 9.1 of the strategy). The project would also result in a direct capital investment of approximately $1 billion to the state of NSW. The project is critical to addressing energy, cost, security and reliability issues and would benefit the residents of the Greater Sydney area, including Central Coast residents.
– The project would be located in an existing industrial area and re-use the former Munmorah Power Station. The site has been subject to significant disturbance and is highly modified and disturbed with limited vegetation present and is not considered to be a fragile environment. A BDAR undertaken for the EIS assessed the existing environment and biodiversity values present that would be impacted by the project. Due to the limited vegetation present within the site, the bushfire threat from within the project site is low. Additionally, appropriate asset protection zones would be implemented to mitigate bushfire risk and a Fire Safety Study prepared based on the finalised design. Batteries would also have a fire detection system implemented and be regularly inspected for signs of damage to prevent leaking. A PHA conducted for the project concluded that the frequency of a fatality or injury is negligible for offsite locations and negligible for onsite locations and that the project complies with the individual fatality and injury risk criteria specified in the NSW Department of Planning and Environment's 2011 publication *HIPAP No. 4 – Risk Criteria for Land Use Safety Planning*.

Submission ID SE-52021707, Kevin Riley, Halekulani

Issue raised:

The submitter raised concerns regarding the location of the project relative to the local community and the impact on adjacent sensitive areas. Specific requests and concerns include:

– Noise transmission from the cooling fans would be heard at nearby residential areas.
– The project is a fire hazard.
– The EIS was 212 pages and was not easily understood.

Response:

– A noise and vibration assessment was undertaken for the EIS. Cooling fan noise levels were modelled based on conservative available manufacturer data. The noise modelling indicates predicted operational noise levels for all sensitive receivers would be compliant for day and evening periods. The only exception being during the night time where temperatures exceed 35°C. However, recent temperature history indicates the maximum night time temperature has never reached 35°C and no significant impacts are therefore expected to occur.

  Mitigation measures provided in Appendix C of the EIS will ensure any potential noise impacts are kept to a minimum. This includes operational noise monitoring being undertaken at commissioning and/or following the commencement of operations which will ensure no significant noise impacts to nearby residents.
– Mitigation measures included in the EIS require that the project include a fire detection system to mitigate the risk of combustion within the battery energy storage system. Additionally, battery housings would be secured on concrete pads and all electrical connections underground which will reduce the potential fire risk. Mitigation measure BR3 outlines that a Bushfire Emergency Management and Evacuation Plan would be prepared in accordance with NSW RFS guidelines during both construction and operation of the project. Appropriate asset protection zones would also be implemented in accordance with the *Planning for Bushfire Protection* guidelines. The mitigation measures outlined in the EIS would reduce potential bushfire and fire hazards and provide appropriate management measures in the event of a fire event. A detailed Fire Safety Study would also be prepared based on the finalised design.
– The EIS was prepared in accordance with the DPE guidelines for *Preparing a Environmental Impact Statement for State Significant Infrastructure Projects* (DPIE 2022) which ensures EISs are succinct and easy to understand, clearly describe the project, reflect communities feedback, contains a technically robust assessment of project impacts, and justifies and evaluates the project as a whole having regard to the economic, environmental and social impacts of the project and ESD. The EIS has been written in plain English and avoided jargon to explain complex information clearly and made accessible in order to be intelligible to a wide audience.

Submission ID SE-52053459, Ruth Weston, Watanobbi

Issue raised:

The Central Coast does not need or want this “Super Battery” in our area and its associated infrastructure. We are aware that the Central Coast is slated to become a smart city and this battery is just the start.

Response:

– The project will provide positive benefits to the community by delivering economic benefits at both the state and regional level. The project would contribute to delivering the *Central Coast and Lake Macquarie Regional Economic Development Strategy 2018 – 2022* as an opportunity to re-use old electricity infrastructure to support renewable energy business (refer to section 9.1 of the strategy). The project is critical to addressing energy, cost, security and reliability for all residents in Greater Sydney, including the Central Coast.
– The Central Coast is included in the NSW Government Six Cities Region Plan which is currently being developed by the Greater Cities Commission. The aim is to bring the six cities together as a region with better jobs, housing, education and infrastructure to the benefit of each city and community members. The Region Plan and City Plans are currently being drafted and finalised. The project is its own separate stand alone infrastructure project and the assessment and approval process, while located in the Central Coast and aligned to the Six Cities objectives, is not contingent on the delivery of the Six Cities Region Plan.

Submission ID SE-52095721, Name withheld, Lake Munmorah

Issue raised:

The project is a danger to wildlife and surrounding areas. The general public have not been told of this project and we don’t want the battery placed there.

Response:

– The project is located within the former Munmorah Power Station and adjacent to the existing Colongra Power Station and will re-use old electricity infrastructure within an industrial area. As outlined in the EIS, the majority of the project site is cleared and denuded with minimal potential habitat present. Mitigation measures outlined in the EIS include the preparation of a flora and fauna management plan, including protocols for the management and protection of fauna and habitats. No significant impacts to wildlife are anticipated during construction and operation of the project following the implementation of proposed mitigation measures.
– A PHA and bushfire assessment was undertaken for the project EIS. The proposed mitigation measures include the preparation of a Bushfire Emergency Management and Evacuation Plan and Battery Management Plan, including a Fire Safety Study in consultation with FRNSW and NSW RFS. Appropriate asset protection zones would also be implemented in accordance with the *Planning for Bushfire Protection* guidelines. The mitigation measures outlined in the EIS would reduce potential bushfire and fire hazards and provide appropriate management measures in the event of a fire and reduce risk to surrounding areas.
– The general public has been informed of the project. Chapter 5 of the EIS outlines the community consultation that was undertaken during the development of the project. This includes a project website, newsletter which was published on the project website and provided during letter box drops to approximately 2,700 residents and businesses surrounding the project site, various EnergyCo media releases and editorials in newspapers and an enquiry line for phone calls and emails. Community engagement will continue throughout the construction, operation and decommissioning and rehabilitation stages of the project. Given this, it is considered that the degree of community consultation undertaken has been appropriate.

Submission ID SE-52090246, Snowy Hydro Limited, Cooma

Issue raised:

Snowy Hydro Limited owns and operates the Colongra Peaking Power Station which is located adjacent to the northeast of the Waratah Super Battery. Snowy Hydro Limited has raised concerns regarding management of contamination (ground/surface water and air), access and traffic management and impact on current and future connection/ transmission infrastructure and easements. Specific requests and concerns include:

– Snowy Hydro Limited notes there is existing contamination on the project site in the soil and groundwater and potential for airborne contaminants including asbestos and contaminated dust. Snowy Hydro Limited request that conditions be considered and imposed to ensure that the proposed works will not change or impact

existing groundwater/ surface water flows and address all air quality impacts (from dust and other airborne contaminants) such that there is no increase in impacts to Colongra Power Station.

– Snowy Hydro Limited also has concerns regarding access to Colongra and the impact of the proposed development on the access roads over which Snowy Hydro has existing easement access rights. To address this, Snowy requests that it be further consulted regarding traffic management plans and the location of key construction equipment and permanent infrastructure. Specifically Snowy Hydro Limited wishes to understand and provide input regarding the following:
    - potential impacts to existing access easements for the emergency evacuation route that is located in the proposed project zone
    - potential impacts to critical communication assets (fibre optic cable) that run underground in the proposed project zone
    - potential impacts to existing easements and critical protection assets (underground services) that interact with the proposed 330kV transmission corridor
– It is also noted that Colongra's alternate heavy haulage route is also likely to be heavily utilised by the project during and potentially after construction. SHL requests that conditions/management plans will be in place to ensure:
    - the project construction and operation will not restrict/interrupt operations at Colongra
    - the new infrastructure would not impede SHL's current existing heavy haulage access for vehicles and equipment in particular with regard to necessary clearances and safe approach distances.
– Finally, Snowy Hydro Limited also has concerns regarding the location of the proposed 60m transmission easement and the impacts this may have for future requirements for transmission and connection to the Transgrid switchyard for Colongra assets. The figures and designs provided in the EIS are indicative and not final. SHL therefore considers it possible that infrastructure and easements to connect the battery into the existing substation may restrict future augmentation of Colongra. As a peaking power station Colongra fills a critical role within the National Energy Market that is likely to increase in the coming years. As such consideration should be given to the potential for Colongra to expand to meet the requirements of the NEM and ensuring that connection configurations are not unnecessarily restricted by the Project.

Response:

Contamination

The existing conditions at the project site regarding soil and water contamination are outlined in Section 6.4.3.2 and the potential impacts during construction and operation in Section 6.4.4.1 and 6.4.4.2 respectively of the EIS.

Section 6.4.3.2 outlines the steps involved in the preparation of a Remediation Action Plan which includes preparation of a CEMP for the site remediation activities to reduce the risk from contamination to a level consistent with the proposed future use for the Waratah Super Battery. GPM will complete the necessary remediation activities prior to the development of the Waratah Super Battery including provision of a Site Audit Statement indicating that the site it suitable for its intended use.

Construction and operation of the Waratah Super Battery will be undertaken in accordance with the requirements of the contamination OEMP for the site. Mitigation measure L4 also requires the preparation of a contamination management subplan to manage residual contamination issues and risks at the site. Mitigation measures AQ1 to AQ4 would be designed and implemented to ensure that all sources of dust emissions are minimised during construction.

Access and traffic management

EnergyCo acknowledges that parts of the site would in future be shared with Snowy Hydro Limited, including the site access road and in this regard, EnergyCo, Akaysha Energy and GPM will continue to work with Snowy Hydro Limited on all site-based matters to minimise potential disruption and impacts during construction and operation of the Waratah Super Battery.

The easement for emergency access is to enable safe evacuation of the power station if there is a gas issue preventing the primary access route to be safely used. An alternative (emergency traffic) access route is available and has been previously used by Snowy Hydro Limited during mock exercises and also during the demolition of the Munmorah power station. This route passes through GPM owned land to the south of the project site and

comprises a sealed road with access gates. GPM have agreed that this can be made available again for Snowy Hydro Limited use should that be necessary noting that the proposed construction would not preclude use of the primary access.

The easement for heavy haulage access comprises the common access point to the site. This easement was used several times each day during the Munmorah power station demolition without issue. It is anticipated that need for heavy vehicles by Snowy Hydro Limited which would interact with those of the Waratah Super Battery would only arise in the event of a major plant failure at Colongra and would otherwise be limited to only a few loads which can be readily addressed in the Construction Traffic Management Plan.

Snowy Hydro Limited have provided Akaysha Energy details of services located in the proposed transmission easement and Akaysha Energy are working through the design to avoid the potential for impacts. Similarly, Snowy Hydro Limited have also provided required clearances from the new infrastructure and this is being considered in the detailed design.

The fibre optic cable easement is shown on a number of figures in the EIS including Figure 3.1 of this submissions report. No development is proposed to impact the fibre optic cable which is located north of the access easement.

EnergyCo is confident that construction and operation of the Waratah Super Battery can proceed with limited impacts to the operation of the Colongra Power Station as was the case during the operation of the former Munmorah Power Station and during its demolition. Where impacts cannot be avoided or are likely to occur, EnergyCo and/or Akaysha Energy will consult with Snowy Hydro Limited about mitigative arrangements. Mitigation measure T1 has been amended to include the requirement for the Construction Traffic Management Plan to be prepared in conjunction with Snowy Hydro Limited.

Connection/ transmission

EnergyCo acknowledges the important role Colongra plays in the NEM as a peaking power station. EnergyCo also considers the SIPS, of which the Battery Energy Storage System (BESS) located at the Munmorah site is a part, as an important component of the NSW transmission system. It is EnergyCo's view that connection of the Waratah Super Battery to the electricity network falls under the 'Open Access' regime and is governed by Chapter 5 of the National Electricity Rules.

EnergyCo will work with Snowy Hydro and GPM to coordinate future development at the Munmorah site with the intent to reasonably limit impacts from the proposed transmission line easement. However as the application for connection to the electricity network is regulated separately under the National Electricity Rules, EnergyCo does not consider that Snowy Hydro Limited's concerns are relevant to DPE in its assessment and determination of the project.

7. Updated project justification and conclusion

As outlined in Section 8.1 of the EIS, the Waratah Super Battery is considered justified because it:

– Responds to a critical, recognised need and is consistent with several state and federal government plans, policy, and guidelines with regards to planning for a reliable, affordable, and sustainable electricity future in NSW.
– Is proposed on a site which is already appropriately zoned for energy infrastructure, was formerly used for operation of the Munmorah Power Station, is remote from sensitive receivers and would not result in any foreseeable land use conflicts with surrounding developments.
– Provides major, short-term and long-term benefits to Sydney, the Central Coast, Newcastle, Wollongong, and NSW.
– Would not result in significant, adverse environmental, social, or economic impacts.
– Is consistent with the principles of ecologically sustainable development, the objects of the EP&A Act and is considered to be in the public interest.

The project received only a small number of submissions, with the majority from Government agencies either supportive, recommending conditions or identifying matters that can be readily addressed during subsequent project development processes.

Following public exhibition, EnergyCo has undertaken additional environmental investigations and assessments (refer Section 3.2) and made a number of minor refinements to the project (refer Section 3.3) to more fully align with the current design of the facility provided by the service provider Akaysha Energy. These additional studies confirm the findings of the assessments contained in the EIS and the conservative basis of the methods used. A number of minor changes have also been made to the mitigation measures to respond to specific issues of concern raised in submissions and to more fully tailor them to the project issues and risks.

The project is critical to support the NSW Government's electricity strategy and infrastructure roadmap. The project has been designed and assessed with regard to the matters for consideration under Section 5.16 of the EP&A Act, including the objects of the EP&A Act and is consistent with the principles of ecologically sustainable development and therefore in the public interest.

It is recommended the project is approved.

8. References

Austroads, 2020, 'Guide to Traffic Management – Part 12: Integrated Transport Assessments for Developments, Edition 3.0.'

Central Coast and Lake Macquarie Council 2018, Central Coast and Lake Macquarie Regional Economic Development Strategy 2018 – 2022.

Department of Planning 2011a, Hazardous Industry Planning Advisory Paper No 4.

Department of Planning 2011b, Hazardous Industry Planning Advisory Paper No 2.

Department of Planning, Industry and Environment 2022a, State Significant Infrastructure Guidelines - Preparing a Submissions Report.

Department of Planning, Industry and Environment 2022b, Undertaking Engagement: Guidelines for State Significant Projects.

Department of Planning, Industry and Environment 2022c, Preparing a Environmental Impact Statement for State Significant Infrastructure Projects.

EnergyCo 2022, Waratah Super Battery Environmental Impact Statement.

EnergyCo 2022b, Waratah Super Battery Environmental Impact Statement Biodiversity Development Assessment Report.

International Commission on Non-Ionizing Radiation Protection 2010, Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields (1hz – 100khz).

Natural Resources Access Regulator 2018, Guidelines for Controlled Activities on Waterfront Land.

National Transport Commission 2020, Australian Code for the Transport of Dangerous Goods by Road & Rail.

NSW Rural Fire Service 2015, A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan.

NSW Rural Fire Service, 2019, 'Planning for Bushfire Protection'.

Roads and Maritime Services (RMS) 2002, 'Transport for NSW Guide to Traffic Generating Developments (version 2.2)'.

Standards Australia, 1997, 'AS/NZS 4452 – The storage and handling of toxic substances Storage and Handling'.

Standards Australia, 2005, 'AS 2419.1-2005 - Fire hydrant installations System design, installation and commissioning'.

Transport for NSW 2022, Future Transport Strategy: Our vision for transport in NSW.

Appendix A

Register of submissions

Table A.1 Register of submissions

Group	Name	Section where issues addressed in submissions report
Public authorities	Crown Lands	4.1
	Department of Regional NSW	4.2
	Environmental Protection Agency	4.3
	Heritage NSW	4.4
	Department of Planning and Environment - Biodiversity and Conservation Division	4.5
	Fire and Rescue NSW	4.6
	Transport for NSW	4.7
	Geological Survey of NSW	4.8
	Subsidence Advisory NSW	4.9
	Department of Primary Industries – Fisheries	4.10
	Department of Planning and Environment – Water	4.11
	NSW Rural Fire Services	4.12
	Transgrid	4.13
Councils	Central Coast Council	5
Stakeholder groups	Snowy Hydro Limited	6.3
Individuals	Name withheld	6.1
	Quentin Reynolds	6.2
	Name withheld	6.3
	Riley Kevin	6.3
	Ruth Weston	6.3
	Name withheld	6.3

Appendix B

Updated mitigation measures

Updated mitigation measures

Table B.1 below provides a consolidated list of mitigation measures proposed to be implemented for the project. Strikethrough text indicates passages that have been deleted compared to the measures included in Appendix C of the EIS. Bold underlined text indicates new text additions compared to the measures included in Appendix C of the EIS.

Table B.1 Compilation of mitigation measures

No.	Outcome	Mitigation measure	Timing
Biodiversity			
B1	Protection of terrestrial ecology during construction of the project.	Prepare a flora and fauna management sub-plan prior to construction of the project.	Pre-construction
B2	Site workers made aware of the ecological values of the project site, protection measures to be implemented, and penalties for breaches during construction.	All workers are to be provided with an environmental induction prior to starting work on site. This would include information on the ecological values of the site, protection measures to be implemented to protect biodiversity and penalties for breaches.	Pre-construction
B3	Site workers made aware of areas to be protected during construction.	Prepare plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features, threatened plants and TECs in the vicinity of work areas and revegetation areas.	Pre construction Construction
B4	Avoidance of unnecessary vegetation and habitat removal and the transmission of weeds or disease.	Prior to the commencement of any work in or adjoining areas of native vegetation, a survey would be carried out to mark the construction impact boundary. The perimeter of this area would be fenced using high visibility fencing and clearly marked as the limits of clearing. All vegetation outside this fence line would be clearly delineated as an exclusion zone to avoid unnecessary vegetation and habitat removal and the transmission of weeds or disease. Fencing and signage would be maintained for the duration of the construction period. Fencing would be designed to allow fauna to exit the site during clearing activities.	Pre construction Construction
B5	Prevention of weed and pathogen spread and establishment	Wash and disinfect machinery entering the site prior to work on site to prevent the potential spread of weeds, Cinnamon Fungus and Myrtle Rust/Exotic Rust Fungi in accordance with the national best practice guidelines for Phytophthora (O'Gara *et al.* 2005), the Myrtle Rust factsheet (DPI 2015) for hygiene control and the NSW hygiene guidelines for wildlife (DPIE 2020d). Implement protocols to prevent the introduction or spread of chytrid fungus following the NSW hygiene guidelines for wildlife (DPIE 2020d).	Construction
B6	Protection of unexpected threatened species and inclusion in offset strategy, if required.	Prepare an unexpected finds protocol that details measures to be undertaken if threatened flora and fauna not previously recorded in the project site are detected during clearing or construction activities, or if additional occurrences of threatened species previously recorded in the broader area, but not previously recorded at a specific location, are recorded during clearing or construction activities. Include any unexpected finds in the offset strategy, as required.	Construction

No.	Outcome	Mitigation measure	Timing
B7	Protection of fauna and fauna habitat.	Protocols for the management of fauna and habitats would be included in the flora and fauna sub-plan. These would include (if required): – A procedure for the felling of hollow-bearing trees to prevent or minimise mortality of fauna. – Salvage of hollows and logs where practicable. – Temporary frog-proof fencing should be installed where required such as roadside drains and detention ponds near the project site to be retained to prevent frogs from being injured or killed by equipment. – Management of any trenches or drill sites to prevent fauna from becoming trapped or injured.	Construction
B8	Protection of fauna and fauna habitat.	Undertake pre-clearing surveys prior to construction by a suitably qualified ecologist. Ensure surveys and inspections, and any subsequent relocation of species, is undertaken in accordance issue-specific environmental management sub-plans. Include the following specific surveys: – Surveys for roosting microbats for any man-made structures to be removed. – Searches for nest trees in vegetation to be removed. – Identification of hollow-bearing trees and logs requiring fauna management during removal	Construction
Aboriginal and non-Aboriginal heritage			
H1	Protection of unexpected heritage objects/sites.	Implement cultural heritage awareness induction training for all personnel prior to commencing construction on-site.	Construction
H2	Protection of unexpected heritage objects/sites.	In the event of an unexpected archaeological/heritage item find during construction, works within the area would cease and a suitably qualified heritage professional would be engaged to assess the significance and management of the finds. An unanticipated discovery protocol would be implemented that details measures to be undertaken if heritage objects/sites not previously recorded in the project site are detected during clearing, ground disturbance, or construction activities. Example unanticipated discovery protocols are provided in Appendix J **of the EIS**.	Construction
H3	Protection of unexpected skeletal remains.	In the unlikely event that human remains are discovered during construction, all works would cease in the immediate vicinity. The discovery would be reported to Enviroline, Heritage NSW, the local police, and the RAPs. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. An unanticipated discovery protocol would be implemented that details measures to be undertaken if suspected human skeletal remains are detected during clearing, ground disturbance, or construction activities. Example unanticipated discovery protocols are provided in Appendix J **of the EIS.**	Construction
Land			
L1	Further geotechnical testing	Further geotechnical testing and assessment would include consideration of a soil survey to determine whether any specific requirements are necessary to avoid potential erosion and scour.	Design
L2	Management of subsidence	A mine subsidence assessment would be undertaken to guide the future design with the intent that the serviceability of the battery and transmission structures are not compromised if a subsidence event occurs. Further consultation with Subsidence Advisory NSW in relation to subsidence risks and issues related to other continuing titles within the project site.	Design

No.	Outcome	Mitigation measure	Timing
L3	Site suitable for proposed use	Prior to construction occurring at the site, a statement by a NSW Site Auditor is to be provided by GPM indicating that the site is suitable for its intended use. The Site Audit Statement will detail the measures required to manage any residual contamination at the project site.	Design
L4	Contamination management subplan	Potential contamination-related impacts associated with the project will be managed by the implementation of a CEMP that includes (but not limited to): – Reference to and incorporation of any CEMP/OEMP controls or procedures for the site arising from the site Remediation Action Plan and Site audit Statement. – Preparation of a spoil management plan including procedures for handling and storing contaminated and uncontaminated spoil in accordance with the *Protection of the Environment Operations (Waste) Regulation 2014* and protocols for undertaking appropriate sampling and analysis to support waste classification and tracking for any soil surplus. – An unexpected finds protocol, including encountering asbestos containing materials and contaminated soils or groundwater during construction works. Any PFAS containing materials considered for re use onsite should be assessed in accordance with PFAS NEMP 2.0 (HEPA 2020) and seek appropriate regulatory approvals for reuse.	Construction
Noise			
NV1	Site inductions	All employees, contractors and subcontractors will receive an environmental induction. The induction must at least include: – all noise and vibration mitigation measures – relevant licence and approval conditions – permissible hours of work – any limitations on high noise generating activities – location of nearest sensitive receivers – construction employee parking areas – designated loading/unloading areas and procedures – site opening/closing times (including deliveries) – environmental incident procedures.	Construction
NV2	Schedule activities to minimise noise impact	All activities on site will be confined between the hours of 7:00 am to 6:00 pm from Monday to Friday and 8:00 am to 1:00 pm on Saturday, with the exception of the following activities: – the delivery of oversized plant or structures – emergency work to avoid the loss of life or damage to property, or to prevent environmental harm.	Pre-construction / Construction
NV3	Construction Noise and Vibration Sub Plan	A Construction Noise and Vibration Management Plan will be prepared as part of the CEMP and implemented during construction. The plan will detail processes, responsibilities and measures to manage noise and vibration and minimise the potential for impacts during construction. The Construction Environmental Management Plan CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.	Pre-construction / Construction

No.	Outcome	Mitigation measure	Timing
NV4	Out of hours works	An out of hours works procedure will be developed as part of the CEMP for the project if these works are required. This should include a detailed construction noise and vibration assessment for the potential construction activities proposed to occur out of hours. An out of hours works application form for any works outside of the approved working hours for the project will be required. A description of the works, justification and management measures would also be included as part of the application.	Pre-construction / Construction
NV5	Plant noise levels	The noise levels of plant and equipment should have an operating sound power lower or similar to the levels presented in Appendix G **of the EIS**.	Pre-construction / Construction
NV6	Maintain equipment	Regularly inspect and maintain equipment to ensure it is in good working order. Also check the condition of mufflers. Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.	Construction
NV7	Equipment design	Battery supplier selection and the site layout would ensure project noise trigger levels outlined in Appendix G **of the EIS** would not be exceeded at any sensitive receivers.	Detailed design / Pre-construction
NV8	Complaints handling	To address situations where noise emission levels are perceived by residents to be a problem, procedures will be developed for receiving, handling, responding to and reporting community complaints.	Operation
NV9	Noise monitoring qualifications	All attended noise monitoring is to be carried out by a suitably qualified noise specialist. Records of routine equipment calibration and testing are to be maintained by the qualified noise specialist undertaking the monitoring.	During operation
NV10	Operational noise monitoring	Noise monitoring is to be carried out at commissioning and/or following the commencement of operations, inclusive of any staging of operations, when the battery is both operating in standby and discharge modes. Operational noise monitoring should be repeated following any major changes to battery configuration/ supplier or maintenance activities which is likely to have an impact on noise emissions.	During operation
Transport			
T1	Minimise impacts to traffic and transport networks.	Develop a construction traffic management sub-plan **in accordance with Australian Standard 1742.3 and the Work Health and Safety Regulation 2017**, prior to construction. **The CTMP will identify strategies to manage the impacts of project-related traffic and be prepared in consultation with Central Coast Council, Transport for NSW and Snowy Hydro Limited.** Include, at a minimum, the following management measures: – Preparation of a Traffic Guidance Scheme, detailing adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised. ~~– Preparation of a Traffic Guidance Scheme, detailing adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised.~~ – Maintain accessibility for pedestrians and cyclists. – Indicate routes to be used by heavy construction-related vehicles **including OSOM loads** to minimise impacts on sensitive land uses and businesses. **Additional permits will be required prior to OSOM vehicles being used.**	Pre-construction

No.	Outcome	Mitigation measure	Timing
		– **Road Condition Reports will be prepared before any local road is used by a heavy vehicle. Where damage to the road network (beyond normal wear and tear) is caused by these heavy vehicle movements, the road will be restored to at least the condition it was pre-works or compensation will be offered to the road owner.** – Implement measures to manage traffic flows around the area affected by the construction of the project, including, as required, regulatory and direction signposting, line marking, and variable message signs and all other traffic control devices necessary for the implementation of the construction traffic management sub-plan. – Undertake consultation with **Snowy Hydro Limited and** the relevant road authorities during preparation of the sub-plan. Ensure the performance of project traffic arrangements is monitored during construction.	
T2	Minimise impacts to the operation of the Colongra Power Station	Ensure trucks used for the delivery of diesel to the Colongra Power Station are unimpeded.	Construction
T3	Minimise environmental impacts associated with the movement of vehicles.	Monitor **sealed** roads leading to and from the project site and take necessary steps to rectify any **dirt, mud or other** ~~road~~ deposits caused by site vehicles, to maintain the safety of road users. Where possible, offset the construction vehicle activity from peak periods of road network activity.	Construction
T4	Minimise environmental impacts associated with the movement of vehicles.	Induct employees and contractors to raise awareness and understanding of traffic and transport mitigation measures to be implemented during construction via the CEMP.	Construction
Water			
W1	Appropriate management of stormwater drainage to prevent flooding.	Review site hydrology and proposed stormwater drainage requirements to allow stormwater to be appropriately managed (quantity, velocity and quality) and in accordance with relevant requirements. This would include consideration of climate change impacts and the site's location relative to adjacent sensitive receivers. Consider opportunities for a dual-use stormwater system to manage risks to water quality during emergencies such as fire.	Design
W2	Appropriate management of water source(s).	Undertake a construction water balance and identify appropriate sources of water in the required quantities.	Pre-construction
W3	Impacts to surface water quality are eliminated/reduced.	Develop and implement a construction soil and water management sub-plan. Include a monitoring and maintenance program, an unexpected finds procedure, as well as a trigger action response plan. **The sub-plan will include relevant precautions and controls outlined in the *Guidelines for Controlled Activities on Waterfront Land* (NRAR, 2018).**	Pre-construction, construction
W4	Impacts to surface water quality are eliminated/reduced.	Develop and implement a decommissioning and rehabilitation soil and water management sub-plan. Include a monitoring and maintenance program, an unexpected finds procedure, as well as a trigger action response plan. Risks should be re-assessed based on proposed activities following operation.	Decommissioning and rehabilitation

No.	Outcome	Mitigation measure	Timing
Hazards			
HR1	Eliminate/reduce risk of thermal runaway event	– Select lithium iron phosphate chemistry for the battery type. – Reassess risk of a thermal runaway event occurring once detailed design is confirmed and battery supplier is selected. – Subject to revised modelling using project specific information, the battery should be located at least 4.5 metres from the site boundary. – Design, install and operate the battery energy storage system in accordance with manufacturers requirements, relevant design codes and electrical standards, informed by recent battery incidents and in accordance with a project specific Battery Management Plan (see HR4) – Conduct of a fire safety study for the proposed design **(refer HR4)**. ~~– Install a dedicated fire suppression system in the unlikely event of a fire.~~ – Consult with relevant authorities during design development including access provisions, levels of training, site fire facilities, etc.	Design
HR2	Eliminate/reduce risk of EMF exposure	– Design and selection of electrical equipment to adopt prudent avoidance principles. – Install fit for purpose electrical systems. – Fence and sign all areas containing high voltage equipment e.g., switchyard to minimise risk of accidental entry by untrained personnel.	Design
HR3	Eliminate/reduce risk of construction/ decommissioning accidents	– Prepare a construction management plan, and when needed, a decommissioning plan, to manage construction/ decommissioning-related risks, including traffic management, designated pedestrian areas within the core development site and bushfire management. – Develop safe work method statements to guide construction/ decommissioning activities, including crane operation, installation of electrical equipment and chemical handling procedures. – Provide appropriate Personal Protective Equipment to all staff.	Construction/ decommissioning
HR4	Eliminate/reduce risk of thermal runaway event	A Fire Safety Study **would be** developed and implemented in consultation with **NSW RFS/** Fire+Rescue NSW and incorporated into a Battery Management Plan. The Fire Safety Study is to capture the key battery safety requirements outlined in relevant publications including Occupational Safety and Health Administration, 2019, Battery University, 2017 and Tesla, 2017. Key aspects of the plan should include: – Compliance with all manufacturers installation and operational requirements. – Quality certification for supply and installation activities. – Minimum battery container separation distances. – Minimum battery container separation distances. – Systems for monitoring, control and management of battery charging activities. – Inspection and maintenance requirements. – Emergency response and preparedness.	Commissioning /Operation

No.	Outcome	Mitigation measure	Timing
Bushfire			
BR1	Reduce potential bushfire radiant heat flux exposure of Waratah Super Battery assets to tolerable levels.	Implement a 25-metre-wide APZ along the western and southern side of the project site (no APZ required to east and north as no bushfire prone vegetation present within 100 metres), unless a performance-based solution adequately demonstrates that a smaller APZ would meet the aims and objectives of the Planning for Bushfire Protection guidelines.	Design
BR2	Provide appropriate access for fire appliances to facilitate Waratah Super Battery protection during bushfire.	Provide a vehicular access track around the Waratah Super Battery, consistent with access standards in Planning for Bushfire Protection (NSW RFS 2019).	Design
BR3	Bushfire emergency plans in place establishing preparedness and response arrangement for a bushfire emergency.	Prepare a 'Bushfire Emergency Management and Evacuation Plan' **in consultation with NSW RFS and** in accordance with the RFS document 'A Guide to Developing a Bushfire Emergency Management and Evacuation Plan' for the construction and operation phases of the project.	Construction and Operation
BR4	Waratah Super Battery bushfire prevention.	Establish a 'hot works management system' for both construction and operation phases to prevent accidental bushfire ignition from hot works on site.	Construction and Operation
Social and economic			
SE1	Implementation of ongoing, regular, and transparent communication with stakeholders	EnergyCo would continue to manage and deliver community and stakeholder engagement in the lead up to construction of the project. This would help to ensure that: – The community and stakeholders have a high level of awareness of all processes and activities. – The community and stakeholders are made aware of any potential disturbances and/or disruptions well in advance of them occurring. – Accurate and accessible information is made available. – A timely response is given to issues and concerns raised by the community. – Feedback from the community is encouraged. – Opportunities for input are provided.	Pre-construction
SE2	Ongoing community engagement during construction activities	A project-specific communication management plan would be developed by the service provider in accordance with the Community and Stakeholder Engagement Strategy and implemented to define the specific requirements for engagement during delivery of the project. This would be developed and implemented to ensure that residents and stakeholders are notified in a timely manner about works activities and potential for impacts, accurate information is accessible, and enquiries and complaints are managed in a timely manner. The plan would include approaches and protocols to: – Communication and notification with potentially affected residents and stakeholders about work activities and potential for impacts. – Communication accurate project information. Requirements for the complaints management system to be implemented throughout the duration of the project, including 24-hour, seven days a week phone line, postal and email address for written enquiries, and publication of contact details.	Construction

No.	Outcome	Mitigation measure	Timing
SE3	Non resident workforce accommodation	An accommodation strategy would be developed for the project to plan for the accommodation needs of any non-resident workers. The strategy would include: – Information to be shared by EnergyCo about workforce and accommodation requirements in a timely manner in line with the Community and Stakeholder Engagement Strategy. – Plan for the responsible use of local accommodation in suburbs near to the site.	Construction
SE4	Local and Indigenous employment and procurement	EnergyCo would develop and implement an industry and Aboriginal participation plan in its contract with the service provider.	Construction
Waste			
WA1	Waste generation is minimised during construction.	Ensure that detailed design includes a focus on optimising earthworks to minimise excess spoil volumes and maximise the reuse of material on site. where practicable.	Design
WA2	Waste is classified and managed in accordance with regulatory requirements.	Classify waste in accordance with the Waste Classification Guidelines (NSW EPA 2014) and manage in accordance with the POEO Act and associated regulations.	Construction and operation
WA3	Construction waste is stored, segregated, handled, transported, and recovered or disposed of appropriately and in accordance with circular economy and waste hierarchy principles.	Prepare a construction waste management sub-plan prior to construction of the project. Adopt the circular economy principles and the waste hierarchy contained in the *Waste Avoidance and Resource Recovery Act 2001*. Detail processes, responsibilities, and measures to manage waste and resource use, and minimise the potential for impacts during construction.	Construction
WA4	Operational waste is stored, segregated, handled, transported, and recovered or disposed of appropriately and in accordance with circular economy and waste hierarchy principles.	Prepare an operation waste management sub-plan prior to operation of the project. Adopt the circular economy principles and the waste hierarchy contained in the *Waste Avoidance and Resource Recovery Act 2001* including a commitment to recycle batteries as far as practical. Detail processes, responsibilities, and measures to manage waste and resource use and minimise the potential for impacts during operation.	Operation
WA5	Decommissioning and rehabilitation waste is stored, segregated, handled, transported, and recovered/recycled or disposed of appropriately and in accordance with circular economy and waste hierarchy principles.	Prepare a decommissioning and rehabilitation waste management sub-plan prior to closure of the project. Include details on all relevant legislative and regulatory requirements and details of the proposed waste classification, demolition waste stockpiling, storage, handling and reuse, recycling, and disposal requirements. Also include an updated investigation of opportunities and feasibility of recycling of batteries. Undertake a detailed examination of battery life and investigate opportunities and feasibility of recycling spent batteries prior to operations commencing if not able to be returned to the manufacturer or supplier.	Operation, decommissioning and rehabilitation
Air quality			
AQ1	Dust emissions are minimised during construction.	Prepare a construction dust control protocol that details management measures, a method for recording dust complaints, and monitoring requirements.	Pre-construction
AQ2	Dust emissions are minimised during construction.	On days with forecast and actual high winds (i.e., over 10 m/s), reduce work effort accordingly if wind-blown dust is observed to be leaving the site boundary.	Construction

No.	Outcome	Mitigation measure	Timing
AQ3	Dust emissions are minimised during construction.	Undertake dust suppression, as required, using water sprays, water extension agents, soil stabilising polymers or other media on: – Unpaved work areas subject to traffic or wind. – Spoil and aggregate stockpiles. – During the loading and unloading of dust generating materials. – Unpaved access tracks.	Construction
AQ4	Dust emissions are minimised during construction.	If the works are creating levels of dust which may significantly impact on public amenity, modify or stop the works until the dust hazard is reduced to an acceptable level.	Construction
AQ5	Ignition risk, spills, and air emissions are minimised during construction and operation.	Maintain plant and equipment in good condition to minimise ignition risk of fuel or chemicals, spills, and air emissions that may cause nuisance.	Construction and operation

Appendix C

Updated biodiversity credit reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00034356/BAAS19007/22/00034357

Proposal Name
Waratah Super Battery

BAM data last updated *
19/12/2022

Assessor Name
Andrew Charles Michael Smith

Assessor Number
BAAS19007

BAM Data version *
56

Proponent Names
Niall Madden

Report Created
16/01/2023

BAM Case Status
Finalised

Assessment Revision
11

Assessment Type
Part 4 Developments (General)

Date Finalised
16/01/2023

BOS entry trigger
BOS Threshold: Biodiversity Values Map

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

Potential Serious and Irreversible Impacts

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

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater
Petaurus australis / Yellow-bellied Glider
Ephippiorhynchus asiaticus / Black-necked Stork
Ixobrychus flavicollis / Black Bittern

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

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast	Not a TEC	0.2	0	4	4
1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	3	3

1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1138, 1253, 1625, 1636, 1638, 1776, 1778, 1782, 1786	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	1636_Moderate	No	4	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 837, 839, 926, 971, 1064, 1092, 1227, 1230, 1231, 1232, 1235, 1649, 1715, 1716, 1717, 1718, 1719, 1721, 1722, 1723, 1724, 1725, 1730, 1795, 1798	-	1724_Moderate	No	3	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Angophora inopina / Charmhaven Apple	**1636_Moderate**	0.2	4.00

Cercartetus nanus / Eastern Pygmy-possum	**1636_Moderate**	0.2	4.00
Chalinolobus dwyeri / Large-eared Pied Bat	**1636_Moderate, 1724_Moderate**	0.3	11.00
Crinia tinnula / Wallum Froglet	**1636_Moderate, 1724_Moderate**	0.3	5.00
Heleioporus australiacus / Giant Burrowing Frog	**1636_Moderate**	0.2	3.00
Hoplocephalus bitorquatus / Pale-headed Snake	**1636_Moderate, 1724_Moderate**	0.3	7.00
Litoria aurea / Green and Golden Bell Frog	**1636_Moderate, 1724_Moderate**	0.3	7.00
Litoria brevipalmata / Green-thighed Frog	**1636_Moderate, 1724_Moderate**	0.3	5.00
Petaurus norfolcensis / Squirrel Glider	**1636_Moderate, 1724_Moderate**	0.3	7.00
Phascogale tapoatafa / Brush-tailed Phascogale	**1636_Moderate, 1724_Moderate**	0.3	7.00
Planigale maculata / Common Planigale	**1636_Moderate, 1724_Moderate**	0.3	7.00
Uperoleia mahonyi / Mahony's Toadlet	**1636_Moderate, 1724_Moderate**	0.3	7.00

Credit Retirement Options

Like-for-like credit retirement options

Angophora inopina / Charmhaven Apple	Spp	IBRA subregion
	Angophora inopina / Charmhaven Apple	Any in NSW
Cercartetus nanus / Eastern Pygmy-possum	Spp	IBRA subregion
	Cercartetus nanus / Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Crinia tinnula / Wallum Froglet	Spp	IBRA subregion
	Crinia tinnula / Wallum Froglet	Any in NSW
Heleioporus australiacus / Giant Burrowing Frog	Spp	IBRA subregion
	Heleioporus australiacus / Giant Burrowing Frog	Any in NSW
Hoplocephalus bitorquatus / Pale-headed Snake	Spp	IBRA subregion
	Hoplocephalus bitorquatus / Pale-headed Snake	Any in NSW
Litoria aurea / Green and Golden Bell Frog	Spp	IBRA subregion

	Litoria aurea / Green and Golden Bell Frog	Any in NSW
Litoria brevipalmata / Green-thighed Frog	Spp	IBRA subregion
	Litoria brevipalmata / Green-thighed Frog	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW
Phascogale tapoatafa / Brush-tailed Phascogale	Spp	IBRA subregion
	Phascogale tapoatafa / Brush-tailed Phascogale	Any in NSW
Planigale maculata / Common Planigale	Spp	IBRA subregion
	Planigale maculata / Common Planigale	Any in NSW
Uperoleia mahonyi / Mahony's Toadlet	Spp	IBRA subregion
	Uperoleia mahonyi / Mahony's Toadlet	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00034356/BAAS19007/22/00034357

Proposal Name
Waratah Super Battery

BAM data last updated *
19/12/2022

Assessor Name
Andrew Charles Michael Smith

Assessor Number
BAAS19007

BAM Data version *
56

Proponent Name(s)
Niall Madden

Report Created
16/01/2023

BAM Case Status
Finalised

Assessment Revision
11

Assessment Type
Part 4 Developments (General)

Date Finalised
16/01/2023

BOS entry trigger
BOS Threshold: Biodiversity Values Map

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

Potential Serious and Irreversible Impacts

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

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater
Petaurus australis / Yellow-bellied Glider
Ephippiorhynchus asiaticus / Black-necked Stork
Ixobrychus flavicollis / Black Bittern

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast	Not a TEC	0.2	0	4	4.00
1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	3	3.00

1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1138, 1253, 1625, 1636, 1638, 1776, 1778, 1782, 1786	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	1636_Moderate	No	4	Wyong,Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1636_Moderate	No	4	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 837, 839, 926, 971, 1064, 1092, 1227, 1230, 1231, 1232, 1235, 1649, 1715, 1716, 1717, 1718, 1719, 1721, 1722, 1723, 1724, 1725, 1730, 1795, 1798	-	1724_Moderate	No	3	Wyong,Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					

	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 3 or higher threat status	1724_Moderate	No	3	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Angophora inopina / Charmhaven Apple	**1636_Moderate**	0.2	4.00
Cercartetus nanus / Eastern Pygmy-possum	**1636_Moderate**	0.2	4.00
Chalinolobus dwyeri / Large-eared Pied Bat	**1636_Moderate, 1724_Moderate**	0.3	11.00
Crinia tinnula / Wallum Froglet	**1636_Moderate, 1724_Moderate**	0.3	5.00
Heleioporus australiacus / Giant Burrowing Frog	**1636_Moderate**	0.2	3.00
Hoplocephalus bitorquatus / Pale-headed Snake	**1636_Moderate, 1724_Moderate**	0.3	7.00
Litoria aurea / Green and Golden Bell Frog	**1636_Moderate, 1724_Moderate**	0.3	7.00
Litoria brevipalmata / Green-thighed Frog	**1636_Moderate, 1724_Moderate**	0.3	5.00
Petaurus norfolcensis / Squirrel Glider	**1636_Moderate, 1724_Moderate**	0.3	7.00
Phascogale tapoatafa / Brush-tailed Phascogale	**1636_Moderate, 1724_Moderate**	0.3	7.00
Planigale maculata / Common Planigale	**1636_Moderate, 1724_Moderate**	0.3	7.00
Uperoleia mahonyi / Mahony's Toadlet	**1636_Moderate, 1724_Moderate**	0.3	7.00

Credit Retirement Options

Like-for-like options

	Spp	IBRA region
Angophora inopina/ Charmhaven Apple	**Angophora inopina**/Charmhaven Apple	Any in NSW

Angophora inopina/ Charmhaven Apple	**Variation options**		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cercartetus nanus/ Eastern Pygmy-possum	Spp	IBRA region	
	Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	Spp	IBRA region	
	Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
	Variation options		

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Crinia tinnula/ Wallum Froglet	Spp	IBRA region	
	Crinia tinnula/Wallum Froglet	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Heleioporus australiacus/ Giant Burrowing Frog	Spp	IBRA region	
	Heleioporus australiacus/Giant Burrowing Frog	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing	IBRA region

		under Part 4 of the BC Act shown below	
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hoplocephalus bitorquatus/ Pale-headed Snake	Spp	IBRA region	
	Hoplocephalus bitorquatus/Pale-headed Snake	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Litoria aurea/ Green and Golden Bell Frog	Spp	IBRA region	
	Litoria aurea/Green and Golden Bell Frog	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Endangered	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Litoria brevipalmata/ Green-thighed Frog	Spp	IBRA region	
	Litoria brevipalmata/Green-thighed Frog	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Phascogale tapoatafa/ Brush-tailed Phascogale	Spp	IBRA region	
	Phascogale tapoatafa/Brush-tailed Phascogale	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Planigale maculata/ Common Planigale	Spp	IBRA region	
	Planigale maculata/Common Planigale	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Uperoleia mahonyi/ Mahony's Toadlet	Spp	IBRA region	
	Uperoleia mahonyi/Mahony's Toadlet	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Candidate Species Report

Proposal Details

Assessment Id 00034356/BAAS19007/22/00034357	Proposal Name Waratah Super Battery	BAM data last updated * 19/12/2022
Assessor Name Andrew Charles Michael Smith	Report Created 16/01/2023	BAM Data version * 56
Assessor Number BAAS19007	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 11	Date Finalised 16/01/2023	BOS entry trigger BOS Threshold: Biodiversity Values Map

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

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia bynoeana Bynoe's Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Angophora inopina Charmhaven Apple	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Asperula asthenes Trailing Woodruff	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Astrotricha crassifolia Thick-leaf Star-hair	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Callistemon linearifolius Netted Bottle Brush	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Cercartetus nanus Eastern Pygmy-possum	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Chalinolobus dwyeri Large-eared Pied Bat	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Corunastylis sp. Charmhaven (NSW896673) Corunastylis sp. Charmhaven (NSW896673)	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Crinia tinnula Wallum Froglet	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cryptostylis hunteriana Leafless Tongue Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Eucalyptus camfieldii Camfield's Stringybark	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus parramattensis subsp. decadens Eucalyptus parramattensis subsp. decadens	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus parramattensis subsp. parramattensis - endangered population Eucalyptus parramattensis C. Hall. subsp. parramattensis in Wyong and Lake Macquarie local government areas	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Genoplesium insigne Variable Midge Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Grevillea parviflora subsp. parviflora Small-flower Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Heleioporus australiacus Giant Burrowing Frog	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Hoplocephalus bitorquatus Pale-headed Snake	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria aurea Green and Golden Bell Frog	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria brevipalmata Green-thighed Frog	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Maundia triglochinoides Maundia triglochinoides	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Melaleuca biconvexa Biconvex Paperbark	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Melaleuca groveana Grove's Paperbark	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Persicaria elatior Tall Knotweed	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Petauroides volans Greater Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascogale tapoatafa Brush-tailed Phascogale	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Planigale maculata Common Planigale	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhizanthella slateri Eastern Australian Underground Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rutidosis heterogama Heath Wrinklewort	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Tetratheca glandulosa Tetratheca glandulosa	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Tetratheca juncea Black-eyed Susan	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Uperoleia mahonyi Mahony's Toadlet	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Eastern Osprey	Pandion cristatus	Habitat constraints
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat constraints
Giant Dragonfly	Petalura gigantea	Habitat constraints
Glossy Black-Cockatoo	Calyptorhynchus lathami	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Koala	Phascolarctos cinereus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Long-nosed Potoroo	Potorous tridactylus	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
Powerful Owl	Ninox strenua	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Rough Doubletail	Diuris praecox	Refer to BAR
Southern Myotis	Myotis macropus	Habitat constraints
Square-tailed Kite	Lophoictinia isura	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints
Tranquility Mintbush	Prostanthera askania	Refer to BAR
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints

BAM Credit Summary Report

Proposal Details

Assessment Id 00034356/BAAS19007/22/00034357	Proposal Name Waratah Super Battery	BAM data last updated * 19/12/2022
Assessor Name Andrew Charles Michael Smith	Report Created 16/01/2023	BAM Data version * 56
Assessor Number BAAS19007	BAM Case Status Finalised	Date Finalised 16/01/2023
Assessment Revision 11	Assessment Type Part 4 Developments (General)	BOS entry trigger BOS Threshold: Biodiversity Values Map

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast												
2	1724_Moderate	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	52.7	52.7	0.1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		3
											Subtotal	**3**
Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast												
1	1636_Moderate	Not a TEC	55.1	55.1	0.16	PCT Cleared - 58%	High Sensitivity to Gain			1.75		4
											Subtotal	**4**
											Total	**7**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

Angophora inopina / Charmhaven Apple (Flora)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Vulnerable	False	4
								Subtotal	**4**
Cercartetus nanus / Eastern Pygmy-possum (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	4
								Subtotal	**4**
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	7
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	4
								Subtotal	**11**

Crinia tinnula / Wallum Froglet (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	3
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	2
								Subtotal	**5**
Heleioporus australiacus / Giant Burrowing Frog (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	3
								Subtotal	**3**
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3

								Subtotal	**7**
Litoria aurea / Green and Golden Bell Frog (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	4
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	3
								Subtotal	**7**
Litoria brevipalmata / Green-thighed Frog (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	3
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	2
								Subtotal	**5**

Petaurus norfolcensis / Squirrel Glider (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3
								Subtotal	**7**
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3
								Subtotal	**7**
Planigale maculata / Common Planigale (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	4

1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	3
								Subtotal	**7**
Uperoleia mahonyi / Mahony's Toadlet (Fauna)									
1636_Moderate	55.1	55.1	0.16	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Not Listed	False	4
1724_Moderate	52.7	52.7	0.1	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Not Listed	False	3
								Subtotal	**7**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00034356/BAAS19007/22/00034357	Waratah Super Battery	19/12/2022
Assessor Name	Report Created	BAM Data version *
Andrew Charles Michael Smith	16/01/2023	56
Assessor Number	Assessment Type	BAM Case Status
BAAS19007	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
11	BOS Threshold: Biodiversity Values Map	16/01/2023

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

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

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast

Eastern Osprey	Pandion cristatus	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Gang-gang Cockatoo	Callocephalon fimbriatum	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Glossy Black-Cockatoo	Calyptorhynchus lathami	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Golden-tipped Bat	Phoniscus papuensis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Greater Broad-nosed Bat	Scoteanax rueppellii	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Grey-headed Flying-fox	Pteropus poliocephalus	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Large Bent-winged Bat	Miniopterus orianae oceanensis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Little Bent-winged Bat	Miniopterus australis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast

Little Eagle	Hieraaetus morphnoides	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Little Lorikeet	Glossopsitta pusilla	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Masked Owl	Tyto novaehollandiae	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Powerful Owl	Ninox strenua	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Regent Honeyeater	Anthochaera phrygia	1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Scarlet Robin	Petroica boodang	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Speckled Warbler	Chthonicola sagittata	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Spotted-tailed Quoll	Dasyurus maculatus	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Square-tailed Kite	Lophoictinia isura	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Swift Parrot	Lathamus discolor	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Turquoise Parrot	Neophema pulchella	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Varied Sittella	Daphoenositta chrysoptera	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast

White-bellied Sea-Eagle	Haliaeetus leucogaster	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
White-throated Needletail	Hirundapus caudacutus	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
		1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast

Threatened species Manually Added

None added

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

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Black-necked Stork	Ephippiorhynchus asiaticus	1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast
Painted Honeyeater	Grantiella picta	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast
Yellow-bellied Glider	Petaurus australis	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast

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

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Black Bittern	Ixobrychus flavicollis	Habitat constraints
Black-necked Stork	Ephippiorhynchus asiaticus	Habitat constraints
Painted Honeyeater	Grantiella picta	Habitat constraints
Yellow-bellied Glider	Petaurus australis	Refer to BAR

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00034356/BAAS19007/22/00034357	Waratah Super Battery	19/12/2022
Assessor Name	**Report Created**	**BAM Data version ***
Andrew Charles Michael Smith	16/01/2023	56
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS19007	Part 4 Developments (General)	Finalised
Assessment Revision	**Date Finalised**	**BOS entry trigger**
11	16/01/2023	BOS Threshold: Biodiversity Values Map

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones

1	1636_Moderate	1636-Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast	Moderate	0.16	1	Zone 1 (0.16 ha)
2	1724_Moderate	1724-Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	Moderate	0.1	1	Zone 2 (0.1 ha)

Appendix D

Updated hazard and risk assessment

GHD Advisory

Waratah Super Battery

Hazard and Risk Assessment

Energy Corporation of NSW

January 2023

→ The Power of Commitment

Project name		Waratah Super Battery Technical Advisor					
Document title		Waratah Super Battery | Hazard and Risk Assessment					
Project number		12582669					
File name		WSB RTS App D- revised Preliminary Hazard Analysis.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	F. Duncan	G Marshall		D Chubb		2/11/2022
S4	1	F. Duncan	G Marshall		G Marshall		19/01/2023

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1. Introduction

Energy Corporation of NSW (EnergyCo) propose to develop an 850MW lithium-ion battery energy storage system at the site of the former Munmorah Power Station. The battery energy storage system (BESS) would be supported a transformer yard and transmission infrastructure to connect to the National Energy Market (NEM) via the existing Munmorah substation. Additional ancillary infrastructure would also be required to support the project including access roads, site services, an administration building, maintenance building and storage yard, and signage and site security.

The proposed BESS area would be approximately 6.4 hectares in size and located on a 14 hectare site within the former Munmorah Power Station at Colongra on the Central Coast of New South Wales (NSW).

The proposed battery energy storage system, connecting transmission and related infrastructure, and ancillary infrastructure is referred to as 'the project' or 'the Waratah Super Battery'.

1.1 Purpose of this report

This report assesses the potential hazards and risks associated with the construction, operation, and decommissioning and rehabilitation of the project and provides mitigation measures to reduce potential hazards and risks associated with the Waratah Super Battery.

The report has been prepared in accordance the SEARs (refer to Appendix A of the EIS).

1.2 Scope and limitations

This report: has been prepared by GHD for Energy Corporation of NSW and may only be used and relied on by Energy Corporation of NSW for the purpose agreed between GHD and Energy Corporation of NSW as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Energy Corporation of NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Energy Corporation of NSW and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Government plans, policies, and guidelines

The project has been declared Critical State Significant Infrastructure (CSSI) in accordance with Section 5.13 of *the Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 5 of the Planning System State Environment Planning Policy (SEPP). The Minister for Planning is the consent authority, and the project is to be assessed in accordance with the provisions of Division 5.2 of the EP&A Act.

The hazard and risk assessment was prepared with reference to the following plans/ policies/ guidelines:

- NSW State Environment Planning Policy (Resilience and Hazards), 2021 (Resilience and Hazards SEPP).
- NSW Department of Planning and Environment, Hazardous Industry Planning Advisory Paper No 4 – risk criteria for land use safety planning, 2011.
- NSW Department of Planning and Environment, Hazardous Industry Planning Advisory Paper No 6 – guidelines for hazard analysis, 2011.
- NSW Department of Planning and Environment, Multi-level risk assessment, 2011.
- International Commission on Non-Ionizing Radiation Protection, Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic Fields (1 Hz – 100 kHz), 2010.
- UL 9540 – Standard for safety of energy storage systems and equipment, 2021.
- AS 2067 – Substations and high voltage installations exceeding 1 kV a.c., 2016.
- AS/ NZS 5139 – Electrical installations - Safety of battery systems for use with power conversion equipment, 2019.
- NFPA 855: Installation of stationary energy storage systems, 2020.

3. Methodology

The Resilience and Hazards SEPP applies to any project which falls under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. If not controlled appropriately, some activities within these industries may create an offsite risk or offence to people, property or the environment thereby making them potentially hazardous or potentially offensive. The Resilience and Hazards SEPP requires a screening process be undertaken and if the screening indicates that the project is potentially hazardous, then a preliminary hazard analysis (PHA) is required. If the project is potentially offensive, after considering the quantity and nature of any discharges and the significance of the offence likely to be caused and having regard to surrounding land use, then measures are required to reduce or minimise the offensive impacts.

3.1 Risk screening

The risk screening process typically concentrates on the storage of specific dangerous good classes that have the potential for significant offsite effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with an indication of storage locations. The quantities of dangerous goods are then assessed against the Resilience and Hazards SEPP threshold quantities.

3.2 Hazard identification

Following screening, the Resilience and Hazards SEPP requires a determination of whether the project poses significant risk. Hazard identification highlights any risks associated with the interaction of the project (as a whole) with the surrounding environment. This is a systematic process to identify any potential offsite impacts. The aim of the hazard identification process is to show the project does not pose any significant risk.

The hazard identification is a desktop qualitative assessment and involves documenting possible events that could lead to a possible off-site incident. The assessment then lists all potential causes of the incident, as well as identification of operational and organisational safeguards to prevent the incidents from occurring or to mitigate the impact.

The hazard identification process is conducted for all lifecycle stages of the project.

3.3 Preliminary hazard analysis

For development projects classified as 'potentially hazardous industry', a PHA is required to be completed to determine the risk to people, property and the environment at the proposed location and in the presence of controls. Criteria of acceptability are used to determine if the development project is classified as a 'hazardous industry'. If this is the case, the development project may not be permissible within most industrial zonings in NSW.

The PHA prepared for this project identifies the potential hazards, analyses these hazards in terms of their impact to people and the environment and their likelihood of occurrence, quantifies the resulting risk to surrounding land uses and assess the risk to demonstrate that the project will not impose an unacceptable level of risk.

The Resilience and Hazards SEPP identifies three levels of PHA. If a PHA is required, a judgement of the level of risk associated with the project is determined using the results of the screening and hazard identification stages. The three levels of PHA are:

– Level 1 – if significant but not serious potential for harm is identified, a qualitative PHA is completed.
– Level 2 – if medium potential for harm is identified, a semi-quantitative PHA is completed.
– Level 3 – if high potential for harm is identified, a quantitative PHA is completed.

4. Existing environment

The project site sits within the former Munmorah Power Station at Colongra on the Central Coast of NSW. Munmorah Power Station operated for a period of approximately 50 years prior to its closure in June 2012. In 2016, Munmorah Power Station and its surrounding land area was transferred to Generator Property Management Pty Ltd (GPM). GPM is a government-owned company with, amongst other things, responsibility for decommissioning, demolition and remediation of power station sites remaining in public ownership in NSW. GPM remains responsible for decommissioning, demolition, and remediation of Munmorah Power Station.

The project site has an area of approximately 14 hectares and is relatively flat. It is mostly cleared (except for some small patches of native vegetation) and heavily disturbed from its previous use as a coal stockpile area for the former Munmorah Power Station. A proposed layout plan for the BESS is shown in Figure 4.1. Whilst the final layout may be refined during the detailed design phase, the preliminary hazard identification has been conducted based on this layout.

Infrastructure immediately surrounding the project site includes:

– Telecommunications tower immediately to the north-west.
– Colongra Power Station, approximately 250 metres to the north-east.
– Transmission lines and electrical distribution infrastructure to the north, including Munmorah Substation.
– Former Munmorah Power Station and associated lands to the north-west and north.

Within the locality of the project site are the residential suburbs of Doyalson, San Remo, Buff Point, Budgewoi and Halekulani with the latter being approximately 600 metres distant (and the others farther away). Other public areas of interest are:

– Hammond Canal which is a man-made canal that links Lake Munmorah to Budgewoi Lake, approximately 300 metres north-west of the project site.
– Koala Park, approximately 400 metres north-west of the project site.
– Colongra Swamp Nature Reserve, approximately 650 metres to the north-east of the project site.
– Lake Munmorah, approximately 1.2 kilometres to the south-east of the project site.
– Budgewoi Lake, approximately two kilometres to the south-west of the project site.

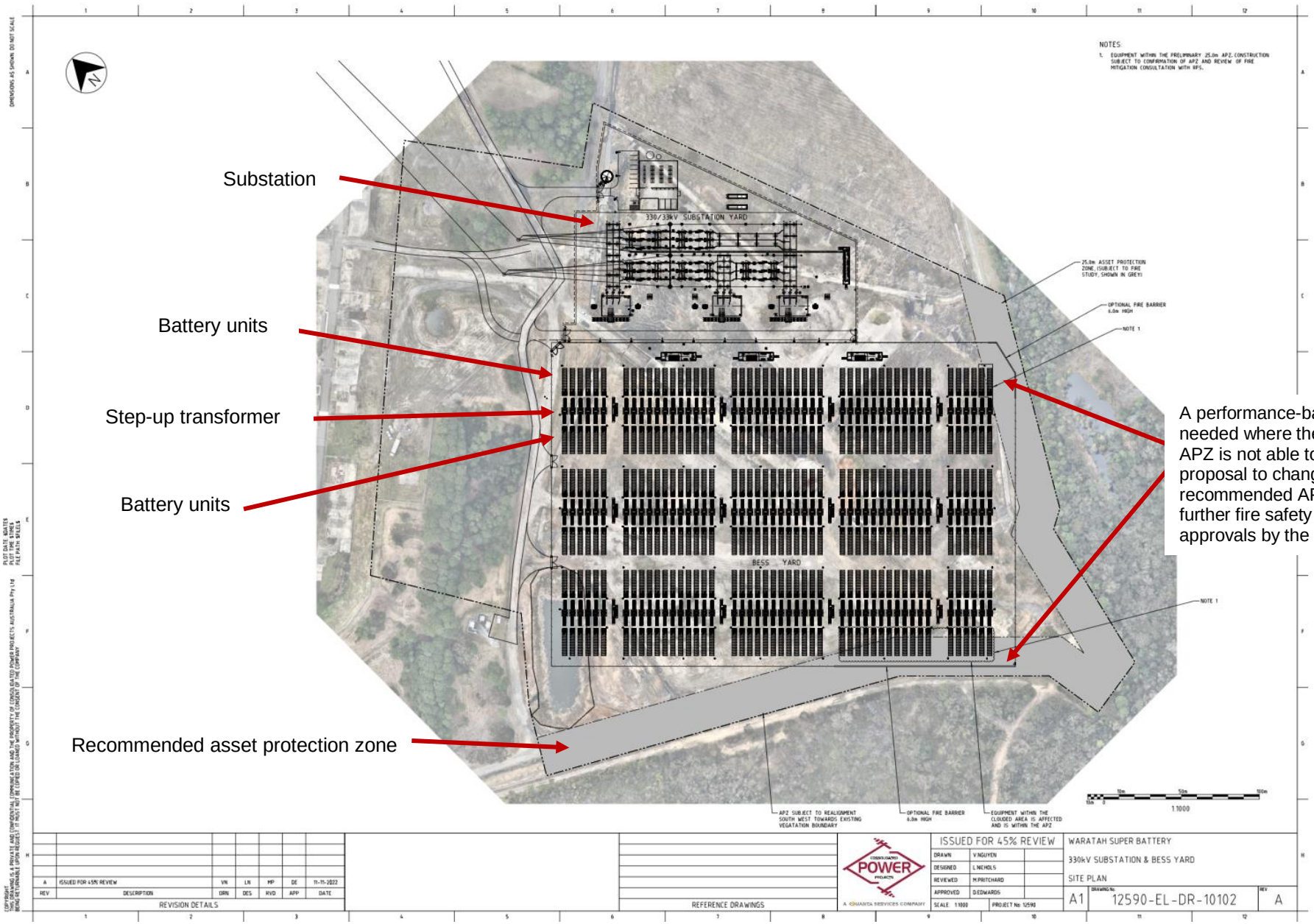

Figure 4.1 Current site layout showing battery units and substation (January 2023)

5. Risk screening

5.1 Construction

Construction of the project would require the use of chemicals and dangerous goods (e.g., paint, solvents, diesel, general oils and lubricants, cleaning products). There would be minimal storage of these chemicals, and no stockpiling would occur during construction of the project. None of the dangerous good thresholds would be exceeded during construction of the project, as per the Resilience and Hazards SEPP. This element of the project lifecycle is not considered potentially hazardous and significant off-site impacts are not anticipated.

Impacts from offensive aspects of the project from construction noise and vibration and dust are referenced in other sections of the EIS.

5.2 Operation

Excluding the lithium-ion batteries, operation of the project would require minimal use of chemicals and dangerous goods. Lithium-ion, refrigerant, coolant, and transformer oil (contained within the transformers only) would be contained within the battery energy storage system. These materials would not be stored onsite apart from what is inside the battery modules. Lithium-ion batteries are a Class 9 dangerous good (miscellaneous dangerous goods and articles) under the Resilience and Hazards SEPP. Transformer oil is a Class C2 dangerous good (combustible liquid) under Resilience and Hazards SEPP. Neither Class 9 or C2 dangerous goods have a SEPP threshold, so none of the dangerous good thresholds would be exceeded during operation of the project, as per the Resilience and Hazards SEPP. However, based on industry knowledge of the battery storage technology, and considering that large battery energy storage systems are a relatively new technology, the project has been considered 'potentially hazardous' and a Level 2 PHA has been prepared for the project.

The nature of a BESS operation is not pre-disposed to emissions, and the project would not release a quantity of pollutant emissions during normal operation to be considered potentially offensive. An assessment of noise and vibration from the operation of the project has been undertaken with findings provided Section 6.6 of the EIS.

5.3 Decommissioning

Decommissioning of the project would require the use of chemicals and dangerous goods (e.g., diesel, general oils and lubricants, cleaning products). There would be minimal storage of these chemicals, and no stockpiling would occur during decommissioning of the project. None of the dangerous good thresholds would be exceeded during decommissioning of the project, as per the Resilience and Hazards SEPP. This element of the project lifecycle is not considered potentially hazardous and significant off-site impacts are not anticipated.

Impacts from offensive aspects of the project from decommissioning and rehabilitation noise and vibration and dust are referenced in other sections of the EIS.

6. Preliminary hazard analysis

6.1 Hazard identification

The results of the desktop hazard identification are provided in Table 6.1, including safeguards. The safeguards are required to ensure the risk scenarios that were identified are contained or at least controlled to an acceptable level.

In undertaking the hazard identification study the following assumptions were made:

– All plant and equipment is installed and operated in accordance with appropriate Australian Standards, codes and guidelines.
– Dangerous goods are stored in accordance with the Australian Dangerous Goods Code, relevant standards and guidelines even if not a licensable quantity.
– All equipment and systems are designed to be inherently safe.

Table 6.1 Hazard identification

Life cycle stage	Hazard	Cause and consequence	Safeguard	Considered in hazard analysis
Construction	Vehicle interactions on public roads	Transport of equipment to site results in a traffic accident leading to a fatality.	Construction Management Plan	No
	Vehicle interactions within the project area	Movement of heavy mobile equipment on site results in a traffic accident leading to a fatality.		No
	Natural hazards	Extreme weather event, such as flooding, earthquake, lightning or bushfire results in equipment damage and/ or construction delays leading to additional costs.		No
	Fire	Hot works activities result in a small fire within the project area leading to equipment damage and/ or construction delays and additional costs.		No
	Loss of containment of chemicals, including dangerous goods	Spill from human error or equipment failure results in environmental damage leading to fines.		No
	Contact with chemicals, including dangerous goods	Spill from human error or equipment failure results in injury leading to first aid or hospitalisation.		No
	Contact with electricity	Human error or equipment failure results in injury leading to hospitalisation.		No
Operation	Vehicle interactions within the project area	Movement of heavy mobile equipment on site results in a traffic accident leading to a fatality.	Safety Management System	No
	Natural hazards (flooding, earthquake, lightning, bushfire)	Extreme weather event, such as flooding, earthquake, lightning or bushfire results in equipment damage.		No

Life cycle stage	Hazard	Cause and consequence	Safeguard	Considered in hazard analysis
	Loss of containment of chemicals, including dangerous goods	Spill from human error or equipment failure results in environmental damage leading to fines.		No
	Contact with chemicals, including dangerous goods	Spill from human error or equipment failure results in injury leading to first aid or hospitalisation.		No
	Contact with electricity	Human error or equipment failure results in injury leading to hospitalisation.		No
	Impact damage of lithium-ion battery assemblies	Handling error during maintenance and/ or replacement activities results in equipment damage.		No
	Electrical installations	Presence of multiple pieces of electrical equipment results in exposure to electric and magnetic fields (EMF).		Yes
	Thermal runaway of lithium-ion batteries	Manufacturing fault, overcharging or overheating within containers results in a large fire leading to injury or fatality.	Battery Management Plan	Yes
Decommissioning	Vehicle interactions on public roads	Disposal of equipment off site results in a traffic accident leading to a fatality.	Decommissioning Management Plan	No
	Vehicle interactions within the project area	Movement of heavy mobile equipment on site results in a traffic accident leading to a fatality.		No
	Natural hazards	Extreme weather event, such as flooding, earthquake, lightning or bushfire results in decommissioning delays leading to additional costs.		No
	Fire	Hot works activities result in a small fire within the project area leading to decommissioning delays and additional costs.		No
	Loss of containment of chemicals, including dangerous goods being removed	Spill from human error or equipment failure results in environmental damage leading to fines.		No
	Contact with chemicals, including dangerous goods during removal	Spill from human error or equipment failure results in injury leading to first aid or hospitalisation.		No
	Contact with electricity during isolation and removal	Human error or equipment failure results in injury leading to hospitalisation.		No

6.2 Hazard analysis

Two hazards were identified that required further analysis. The hazards and the associated analysis are discussed in detail within this section.

6.2.1 Lithium-ion batteries

Lithium-ion batteries are regulated as Class 9 miscellaneous dangerous goods and articles. Lithium-ion batteries contain electrolyte and lithium in various forms, along with other metals. Lithium-ion batteries use an intercalated lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery. The electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a lithium-ion battery cell.

Lithium-ion batteries can pose unique safety hazards since they contain a combustible or flammable electrolyte and may be kept pressurised. If a battery cell is charged too quickly, it can cause a thermal runaway from overvoltage, or dendrite formation (short circuit), leading to potential fires and explosions. Because of these risks, testing standards are more stringent than those for acid-electrolyte batteries, requiring both a broader range of test conditions and additional battery-specific tests. There are also different types of battery chemistry associated with lithium-ion batteries. There is an industry-wide trend to change to the iron phosphate from the conventional magnesium-cobalt-aluminium oxide chemistries due to an order of magnitude or better reduction in thermal runaway risk. The reason for the risk reduction is that iron phosphate lithium batteries have a high chemical and thermal stability and a high temperature tolerance so provide a higher level of safety.

Historically, there have been consumer product battery-related recalls by some companies, including the Samsung Galaxy Note 7 and hoverboards, both recalled for battery fires. Investigations indicate that the key causes for the fires were either the use of non-certified batteries or manufacturing defects (Battery University, 2019).

There are several hazard management options for thermal runaway of lithium batteries. For example, these may include, but are not limited to, lithium chemistry utilised, fusible separators which slow down conduction over certain temperatures, pressure relieving mechanisms, and separation of the anode and cathode to minimise dendrite formation and short circuits.

There are a number of options for containerised lithium-ion batteries, such as ABB PowerStore (ABB, 2020) and Tesla Powerpack (Tesla, 2017) and others that could be used for the project. A final decision on the exact supplier would be determined during the detailed design and procurement phases. General data from associated equipment guides have been utilised and referenced for the following consequence and likelihood calculations.

The refrigerant used in the batteries is typically a dangerous goods Class 2.2 by virtue of the pressure at which it is stored, but with release and partial combustion, could form small quantities of fluorinated hydrocarbons or hydrofluoric acid in the immediate area of the fire (Tesla, 2017). This could cause a localised environmental impact from acidified fire-fighting water that would need to be contained and disposed of in a suitable manner.

Existing situations were reviewed for situations where lithium-ion batteries are located in relatively confined regions with limited ventilation or where lithium-ion batteries provided a thermally based ignition/ toxic release. Whilst these examples are diverse, they have fundamental similarities to typical battery energy storage systems and solar farm installations that assist with consequence understanding.

The release, dispersion, and flammable effect for lithium-ion batteries has been tested with smaller battery assemblies for consumer / retail equipment due to thermal events associated with hoverboards, e-cigarettes or mobile phones (Battery University, 2019). Some events have happened at a larger commercial scale, including a 2 MW battery array in the USA which injured a team of firefighters (FM Global, 2019). Another known event occurred with a US navy test submarine, where thermal runaway apparently happened during charging. The battery size was approximately one megawatt hour. The submarine was closed off and cooled from the outside with water until the reaction had run to completion (Cavas, 2008)

Most recently, the Victorian Big Battery experienced a fire during commissioning. The findings (ESV, 2021) found that fire escalation was due to environmental conditions (such as high wind) not being considered in testing and a weakness in the thermal roof design. Additionally, during commissioning several monitoring and protection systems were switched to off-line service mode, which allowed the initial fault to go undetected and resulted in the total loss of two battery units. The fire response was to allow the on-fire units to burn themselves out, whilst keeping the remaining units cool with water deluge.

A cabinet of batteries within a container could exhibit some similar features of release, such as a gaseous release from electrolyte, refrigerant or coolant. Depending on the materials, heated chlorinated and fluorinated hydrocarbons could be released into the container space. Evidence has shown that the separation distances between cabinets will reduce escalation potential, and slow down propagation of a thermal event from one battery cabinet to adjacent equipment. Additionally, separation of containers will also limit escalation potential.

6.2.1.1 Hazard scenarios

The key hazard for battery systems is thermal runaway, which could result in a battery unit fire. There are a number of causes of thermal runaway:

– Scenario 1: Latent battery failure caused by a manufacturing fault.
– Scenario 2: Overcharging.
– Scenario 3: Overheating within containers.

Thermal runaway from hot joints is considered to be incorporated into the battery failure fault rate in scenario one. Thermal runaway from operational or maintenance handling damage is considered to be minimal and incorporated into the risk of scenario three.

Containing a thermal runaway fire to a single battery unit is critical for risk mitigation. Battery unit separation is an effective control to eliminate fire propagation. Section 6.2.2.2 details the determination of a suitable separation distance that eliminates the risk of fire propagation from one battery unit to others.

6.2.1.2 Battery unit separation assessment

Separation distance between containers is important to limit the potential for overheating adjacent containerised batteries. The most relevant guidance for BESS separation distances comes from the United States of America, as shown in Table 6.2. The 2021 Victorian Big Battery fire highlight the importance of having a functioning battery monitoring system throughout all life-cycle periods (including commissioning). Additionally, the findings from the Victorian Big Battery fire indicate that appropriate thermal testing, such as the inclusion of a variety of environmental conditions, is needed when determining final BESS layout.

Table 6.2 BESS separation distance references

Standard/ Code	Separation distance reference	Comments
NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems 2020	1 m to adjacent ESS units and adjacent walls 3 m from buildings, roads, boundary, hazardous or combustible materials 3 m clearance of combustible vegetation	–
AS 5139 – electrical installations (safety of battery systems for use with power conversion equipment) 2019	0.6 m between equipment	Less relevant because standard focus is on battery system and all other equipment within a battery system room, not specifically between units
UL 9540 – Standard for Safety of Energy Storage Systems and Equipment 2021	1 m to adjacent ESS units and adjacent walls (reduced distances require a large-scale fire test via valid thermal testing process)	Testing regime, whilst compliant to UL 9540A (Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems) did not consider high wind conditions (VBB findings 2022)
FM Global DS 5-33 – Data sheet (Electrical Energy Storage Systems) 2017 (interim revision 2020)	6 m between ESS units (or provide a thermal barrier rated a minimum 1-hour) 2.7 m from combustible elements	Alternative options in lieu of separation can be used to minimise potential for propagation

Standard/ Code	Separation distance reference	Comments
Fisher Engineering Inc and Energy Safety Response Group, 2022, Fire report of technical findings from the Victorian Big Battery Fire	These units had a spacing of 0.15 m to the sides and back of each unit with 2.4 m in front of each unit, after using UL 9540A. Fire escalation was determined to be due to environmental conditions (such as high wind) not being considered in UL 9540A and a weakness in the thermal roof design. Additionally, during commissioning several monitoring and protection systems were switched to off-line service mode, which allowed the initial fault to go undetected and resulted in the total loss of two battery units.	Fire escalated between units separated by 0.15 m Highlights importance of a functioning battery monitoring system

The proposed battery technology for the project is the Powin Centipede BESS hardware, which uses iron phosphate lithium chemistry. There are proposed to be 288 battery units, with individual battery units containing nine battery segments with 28 battery packs each, and each pack has 10 battery cells. Figure 4.1 shows the arrangement of the unit ends separated by a step-up transformer and vehicle access pathways. The unit sides are separated by a maintenance access gap of between 2.4 metres to 2.6 metres. The battery segments within a unit are separated by 0.15 metres, whilst the packs are separated by 0.076 metres.

The updated BESS layout shown in Figure 4.1 also displays the recommended asset protection zone (APZ) for management of risk from bushfires. Locations where battery units are currently shown to impinge on the recommended APZ will require a performance-based solution and would be subject to further bushfire risk studies. Additional to APZ considerations, an ember attack study is in process. This study will form part of the assessment of the transmission potential of a bushfire to the BESS facility and will form part of the fire safety study to be generated during detailed design.

Powin have undertaken cell, module and large-scale unit burn tests using UL 9540A (Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems). The UL 9540A testing also provides fire performance inputs to show compliance to NFPA 855 and IFC 2021. For the purposes of testing impacts to adjacent equipment, it was measured at a minimum distance of 0.076 metres.

The cell testing determined that thermal runaway was initiated at approximately 200 degrees Celsius at the initiated cell. Prior to reaching this temperature, no smoke or flames were observed. The inbuilt battery management system (BMS) is designed and protects against early increases in temperature prior to a thermal runaway event and disconnect and shut down cells from the grid, minimising the likelihood of an event occurring.

The module testing required direct external hearing of a cell within a module to initiate thermal runaway and then measured temperature and heat flux at adjacent modules and designated distances. Whilst the internal temperature in the thermal runaway module exceeded 600 degrees Celsius, the adjacent external module temperature did not reach more than 60 degrees Celsius and the internal module temperature did not exceed 40 degrees Celsius. The heat flux measured at 1.2 metres from the thermal runaway module reached 0.05 kW/m2. This is significantly below the HIPAP 4 risk criteria for injury (4.7 kW/m2).

The large-scale unit testing deliberately intervened to start a fire inside a unit, so that all modules inside could burn. The test was performed outdoors without any wind barriers (on a windy day). The resultant fire burned for approximately two hours and internally reached a temperature about 1,000 degrees Celsius. Whilst the temperature of the external walls of the adjacent units reached almost 550 degrees Celsius, the internal temperature of the modules within the adjacent unit did not exceed 70 degrees Celsius and was generally below 35 degrees Celsius.

Based on the fire propagation testing, the footprint of the project allows for the incorporation of the required number of battery units separated from adjacent vegetation by the recommended APZ.

Given the site layout allows suitable separation for battery modules to manage the thermal runaway fire propagation risk so far as reasonably practicable, the frequency of a fatality or injury is considered negligible for offsite locations and negligible for onsite location and therefore does not exceed the individual fatality or injury risk criteria specified in the NSW Department of Planning and Environment's 2011 publication HIPAP No. 4 – *Risk Criteria for Land Use Safety Planning*. No further assessment of risk is required.

6.2.1.3 Risk assessment

The risk criteria for land use and safety planning within HIPAP 4 (Department of Planning, 2011) include onsite and offsite fatality values, as well as offsite injury and property damage values. The HIPAP 4 fire and explosion risk criteria are summarised in Table 6.3.

Table 6.3 HIPAP 4 Risk Criteria

Impact	Onsite Criteria	Offsite Criteria
Fatality (12.6 kW/m^2 & 21 kPa)	5.00 x 10^{-05}	1.00 x 10^{-06}
Serious injury (4.7 kw/m^2 & 7 kPa)	–	5.00 x 10^{-05}
Property damage (23 kw/m^2 & 14 kPa)	–	5.00 x 10^{-05}

The assessment of risk of fatality, injury and property damage for any thermal runaway event against HIPAP 4 risk criteria is summarised in Table 6.4. There are no expected offsite impacts given the proposed location, and as such the risk of injury, fatality or property damage is negligible and complies with HIPAP 4. The onsite fatality risk also complies with HIPAP 4.

Table 6.4 Risk criteria compliance for thermal runaway events

Event	Frequency per year	Interval years	Compliance
OFFSITE property damage	0	0	Complies
OFFSITE serious injury	0	0	Complies
OFFSITE fatality	0	0	Complies
ONSITE fatality	0	0	Complies

6.2.1.4 Management recommendations

In order to ensure no offsite impact occurs, the BESS should be located at least 4.5 metres from the facility border to ensure compliance with HIPAP guidelines. The current design has an asset protection zone between the BESS and the boundary much greater than 4.5 metres. Also, the greater the distance between the BESS and the site boundary, the better the facility can manage the BESS fire hazard whilst allowing for future growth and expansion of battery storage capacity.

The project would manage potential fire risks through mitigation, as outlined in a battery management plan. Specific management of potential bushfire risk will occur as per recommendation in other sections of the EIS.

Offsite health effects from smoke, which could include small quantities of fluorinated hydrocarbons or hydrofluoric acid are considered low given the lack of combustible material available for a prolonged fire event and the low residential density in the area. A strong wind may have the ability to carry the smoke laterally beyond the site. Additionally, the fluorinated hydrocarbons and hydrofluoric acid could cause a localised environmental impact from acidified fire-fighting water that should be contained and disposed of in a suitable manner.

A battery management plan should be developed and implemented to capture the following key battery safety requirements (Occupational Safety and Health Administration, 2019, Battery University, 2017 and Tesla, 2017):

– Batteries will be stored as per manufacturer specifications.
– Installation of equipment will be in accordance with manufacturer's instructions and by qualified personnel.
– Ensure lithium-ion batteries and associated equipment are tested and certified to ISO 9001, with internal verification processes such as receipt and filing of certification details.
– Compliance to AS/ NZS 5139:2019 (Electrical installations – Safety of battery systems for use with power conversion equipment).
– Verification of installation quality and operational values is required for each battery container.
– A BESS commissioning plan is developed and includes confirmation that the Battery Management System (BMS) is activated and operating during commissioning.
– The battery system will be insulated and containerised.
– Installation of protective barriers around key areas.

- The location of the BESS should have an APZ from the core development area boundary.
- Separation distances between battery containers should be confirmed by the BESS designer/ supplier through appropriate thermal testing/ modelling and comply with AS 2067 (Substations and high voltage installations exceeding 1 kV a.c.).
- Ensure lithium-ion batteries includes protections and circuit controls, such as:
  - Integrated circuit control systems to avoid voltage drift.
  - Current sensing circuits to avoid short circuiting.
  - Built-in positive temperature coefficient to protect against current surges.
  - Circuit interrupt device that opens at excess pressure.
  - Safety vent to release gases on excessive pressure build-up.
  - Separator that inhibits ion-flow when exceeding a certain temperature threshold.
- BMS to properly manage the batteries state of change, including battery balancing devices, to avoid deterioration and individual cell over/ under voltage during operation.
- Ensure lithium-ion batteries and associated equipment are located within a temperature controlled and ventilated location that does not exceed the manufacturer temperature range specification.
- Thermal sensing of the cells to avoid over heating of cells.
- An inspection and maintenance regime for the batteries, HVAC and associated equipment.
- A hot joint monitoring program for battery terminals and connections.
- The lithium-ion batteries storage area will be protected from flooding, based on the annual exceedance probability for the area and subsequent suitable selection of freeboard.
- Avoidance of damaging lithium-ion batteries. Regularly inspect them for signs of damage, such as bulging/cracking, hissing, leaking, rising temperature, and smoking.
- The lithium-ion batteries will have a fire detection system.
- A protocol in place for damaged batteries that will include the following actions:
  - Immediately remove a battery from service and place it in an area away from flammable materials if any sign of damage is present.
  - Before moving a damaged battery, wait a period of time to observe if there is any smoke, as this may be an indication that a thermal reaction is in progress. A damaged battery will also be monitored after removal for evidence of smoke, flame, leakage of electrolyte, leakage of coolant, or signs of heat.
- Follow manufacturer's guidance on how to extinguish small battery fires, which could include using dry chemical extinguishers, foam fire extinguishers, powdered graphite, dirt, or sand. If the fire of a burning lithium-ion battery cannot be extinguished, allow the container to burn out on its own in a controlled and safe manner, using water to cool the outside container.
- A battery emergency response plan to be enacted in the event of a BESS fire. This will be regularly reviewed and tested to ensure relevance.

A review and confirmation that the risk assessment calculations are still valid is required once detailed design is finalised.

6.2.2 EMF

EMF are part of the natural environment. Electric fields are present in the atmosphere and static magnetic fields are created by the earth's core. EMF is also produced wherever electricity or electrical equipment is in use. Transmission lines, electrical wiring, household appliances, and electrical equipment all produce power frequency EMF.

An electronic field is the force that fills the space around every electric charge, including any powered electrical appliance or conductor (e.g. transmission line). Electric fields are measured in volts per metre (V/m) or kiloVolt per metre (kV/m). They occur both naturally and from power generation and are produced every time electricity flows or there is an electrical force. The higher the voltage/ force the stronger the electric field. Electric fields are strongest closest to the source and their level reduces quickly with distance. Most materials act as a shield or barrier to electric fields.

Fields of different frequencies interact with the body in different ways. In Australia, transmission lines and other electrical devices and infrastructure, including substations, operate at a frequency of 50 hertz. This frequency falls within the Extremely Low Frequency (ELF) range of 0 to 300 hertz adopted by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has adopted the ICNIRP Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields (1hz – 100khz) (2010) (ICNRP Guidelines). The ICNIRP Guidelines express limits in terms of 'Reference Levels' and 'Basic Restrictions' under general public and occupational exposure conditions for ELF EMF. ARPANSA has developed its own standard for EMF greater than 100 kHz, which also aligns with ICNIRP's Guidelines for the same frequency range.

A summary of the ICNIRP Guidelines for exposure to ELF EMF (below 100 kHz) is provided in Table 6.5.

Table 6.5 ICNIRP Guidelines for exposure limits below 100 kHz

Exposure characteristics	Electric field strength (kiloVolt per metre – kV/m)		Magnetic flux density (Tesla – T)	
	Occupational	General public	Occupational	General public
1 Hz - 25 Hz	20	5	0.025/f	0.005/f
25 Hz - 300 Hz	500/f	250/f	0.001	0.0002
300 Hz - 3 kHz	500/f	250/f	0.3/f	0.08/f

Where f = frequency in Hz

Using the Australian frequency for transmission lines, the exposure limits specific to high voltage (HV) overhead power lines is displayed in Table 6.6.

Table 6.6 Exposure limits for overhead high voltage power lines (50 Hz)

Exposure characteristics	Electric field strength (volt per metre – V/m)	Magnetic flux density (milliGauss – mG)
Occupational		
Whole working day	10,000	10,000
General public		
Up to 24 hours per day	5,000	2,000

6.2.2.1 Hazard scenarios

They key hazard for electrical installations is EMF. During operation, the following sources of EMF would be present on the project site:

– Proposed onsite switchyard.
– New proposed 330 kV transmission lines (two) to connect into the Munmorah Substation.

6.2.2.2 Consequence assessment

The layout of the switching yard and the selection of equipment which would be undertaken during detailed design would be in line with the design of similar substations located throughout Australia. The principles of prudent avoidance would be implemented, and careful positioning and selection of equipment is likely to result in exposure levels at the boundary of the substation being similar to existing background levels. Fencing around the switching yard (and wider site) would ensure that members of the public would be at negligible risk of exposure from the substation. Access to the switching yard would only be available to suitably trained workers.

While the rest of the electrical equipment to be located on site would generate magnetic fields, due to their voltage levels and substantial distance to the nearest sensitive receivers they are likely to comply with limits for both public and occupational exposure. Exposure levels are likely to be close to background levels at the property boundary. Security fencing to be erected around the site would also prevent access to the site by members of the public and, therefore, limiting their exposure.

The proposed route for the overhead transmission line would run along the north-eastern boundary of the former Munmorah Power Station. It would be approximately 650 metres long. The route does not go through residential areas.

TransGrid (2020) have indicated that the magnetic flux from typical HV transmission lines, such as those seen on the transmission line for the project, are:

– 10 – 200 mG directly under a HV transmission line for people doing ground-based activities.
– 2 – 50 mG at the edge of a HV transmission line easement (typically 22.5 to 35 metres from the centre line) for people doing ground-based activities

These magnetic fields are well below the levels contained within the interim guidelines on limits of exposure (see Table 6.6).

The new overhead transmission line would have an easement width of around 45 metres. Houses, buildings, and other substantial constructions would be prohibited within the proposed easement. Regardless of route selection, the transmission line would operate in the same way as existing power lines in the area and would present a minimal EMF risk to the general public or workers.

As the consequence impact is not considered significant, no further discussion is needed within the PHA.

6.2.3 Cumulative risk

The proposed location of the BESS is located within a power generator precinct, with the Colongra Power Station and the Munmorah Substation located in proximity to the BESS. As with the BESS, the power station and the substation will have fire and explosion hazards. Like the BESS, the power station and the substation risk profiles are anticipated to be focused within their respective boundaries and therefore the cumulative risk is not expected to increase for the area. Additionally, the nature of the fire and explosion hazards and the separation of each facility is not predicted to result in any knock-on effects.

7. Mitigation measures

Mitigation measures proposed to avoid or minimise potential hazards and risks during construction, operation, and decommissioning and rehabilitation of the project are listed in Table 7.1. These measures would be included in the issue-specific environmental management sub-plans for the Waratah Super Battery.

Table 7.1 Mitigation measures – hazards and risk

No.	Risk	Mitigation measure	Timing
HR1	BESS thermal runaway event	Select lithium iron phosphate chemistry for the battery type. Design and selection of all battery equipment should implement items listed in Section 6.2.1.4.	Design
HR2	EMF exposure	Design and selection of electrical equipment to minimise EMF levels and comply with the ICNIRP exposure levels. Install fit for purpose electrical systems.	Design
HR3	Construction/ decommissioning accident	Prepare a construction management plan, and when needed, a decommissioning plan, to manage construction/ decommissioning-related risks, including traffic management, designated pedestrian areas within the core development site and bushfire management. Develop safe work method statements to guide construction/ decommissioning activities, including crane operation, installation of electrical equipment and chemical handling procedures. Provide appropriate Personal Protective Equipment (PPE) to all staff	Construction/ decommissioning
HR4	BESS thermal runaway event	Prepare a battery management plan, including fire safety study to incorporate the items listed in in Section 6.2.1.4.	Operation

8. Conclusion

This PHA addressed the hazard and risk component associated with the project. Specifically, an assessment of potential hazards and risks associated the BESS for the project.

The PHA involved a preliminary risk screening of the project in accordance with the requirements of the Hazards and Resilience SEPP. While the results of the dangerous goods and transport screening indicated that the project does not exceed any of the thresholds within the Hazards and Resilience SEPP requirements, due to the potential for explosion and fire associated with the operation of the lithium-ion battery storage, the project was considered "potentially hazardous".

The initial hazard identification process considered hazards during construction, operation, and decommissioning. Fire started because of construction and/or decommissioning activities is considered a plausible event, as is the interaction with heavy machinery. Both will be managed through the preparation of a construction management plan, and when required, a decommissioning management plan.

During operation, fires started at the BESS are a credible risk and may pose off-site impacts. Given the risk, a Level 2 PHA is an appropriate level of examination and has been included in this report. A Level 2 PHA uses a semi-qualitative approach based on comprehensive hazard identification to demonstrate that the activity does not pose a significant risk.

The PHA determined that the risk arising from the three BESS thermal runaway fire scenarios has been managed so far as is reasonably practicable through separation and does not exceed the individual fatality or injury risk criteria specified in the NSW Department of Planning and Environment's 2011 publication HIPAP No. 4 – *Risk Criteria for Land Use Safety Planning*.

The project presents a minimal EMF risk to the general public and workers as the EMF levels are well below the levels contained within the ICNIRP guidelines.

The PHA demonstrates that the project could be designed, constructed, operated, and decommissioned in a manner that would meet relevant regulations, standards and policies. Therefore, the project does not pose any significant risk or offence.

It is recommended that management procedures and safeguards as listed in Section 7 be implemented to incorporate practices that will prevent risk scenarios occurring.

Any changes to the assumptions used in this report should result in a review of the PHA and update as required.

9. References

ABB, 2020, e-mesh PowerStore modular: flexible and scalable energy storage system

ABB, 2019, e-mesh PowerStore: grid–forming battery energy storage system

Battery University, 2019, Safety concerns with lithium-ion, **https://batteryuniversity.com/learn/article/safety_concerns_with_li_ion**

Battery University, 2017, Making lithium-ion safe, **https://batteryuniversity.com/learn/article/bu_304b_making_lithium_ion_safe**

Cavas, C. P., 2008, Fire deals new setback to Navy's heralded mini-sub **https://web.archive.org/web/20081217174233/http:/www.honoluluadvertiser.com/article/20081214/NEWS08/812140366/1018/localnewsfront**

Coonick, C., BRE National Solar Centre, 2018, Fire and Solar PV Systems – investigations and evidence, issue 2.9

Energy Safe Victoria, 2021, Statement of Technical Findings – Fire at the Victorian Big Battery

Fisher Engineering Inc and Energy Safety Response Group, 2022, Victorian Big Battery Fire: July 30, 2021 – Report of technical findings

FM Global, 2019, Burning concern: Energy storage industry battles battery fires, **https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/burning-concern-energy-storage-industry-battles-battery-fires-51900636**

FM Global, 2017 (interim revision 2020), DS 5-33 – Data sheet (Electrical Energy Storage Systems)

Greenfield, 2019, The Attack-class submarine battery debate: science fiction of engineering?, **https://www.aspistrategist.org.au/the-attack-class-submarine-battery-debate-science-fiction-or-engineering/**

International Commission on Non-Ionizing Radiation Protection, 2010, ICNIRP guidelines for limiting exposure to EMF 1 Hz to 100 kHz

NFPA, 2020, NFPA 855: Installation of Stationary Energy Storage Systems

NSW Department of Planning and Environment, 2011, Applying SEPP 33: Hazardous and Offensive Development Application Guidelines

NSW Department of Planning and Environment, 2011, Multi-level Risk Assessment Guideline

NSW Department of Planning and Environment, 2011, Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning

NSW Department of Planning and Environment, 2011, Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis

NSW Rural Fire Service, 2019, Planning for Bush Fire Protection

Standards Australia, 1997, AS/NZS 4452 – The storage and handling of toxic substances Storage and Handling

Standards Australia, 2016, AS 2067 – Substations and high voltage installations exceeding 1 kV a.c.

Standards Australia, 2019, AS/ NZS 5139 – Electrical installations - Safety of battery systems for use with power conversion equipment

Tesla, 2017, Lithium-Ion Battery Emergency Response Guide, Tesla Powerpack System, Powerwall, and Sub-assembly, All Sizes, Document Number TS-0004027, Revision 04

Tesla Motors, 2016, Tesla Powerpack: Fire Code FAQ, Revision 1.02

TransGrid, 2020, Fact sheet: Electric and Magnetic fields, page 2

UL, 2021. UL 9540 – Standard for Safety of Energy Storage Systems and Equipment

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