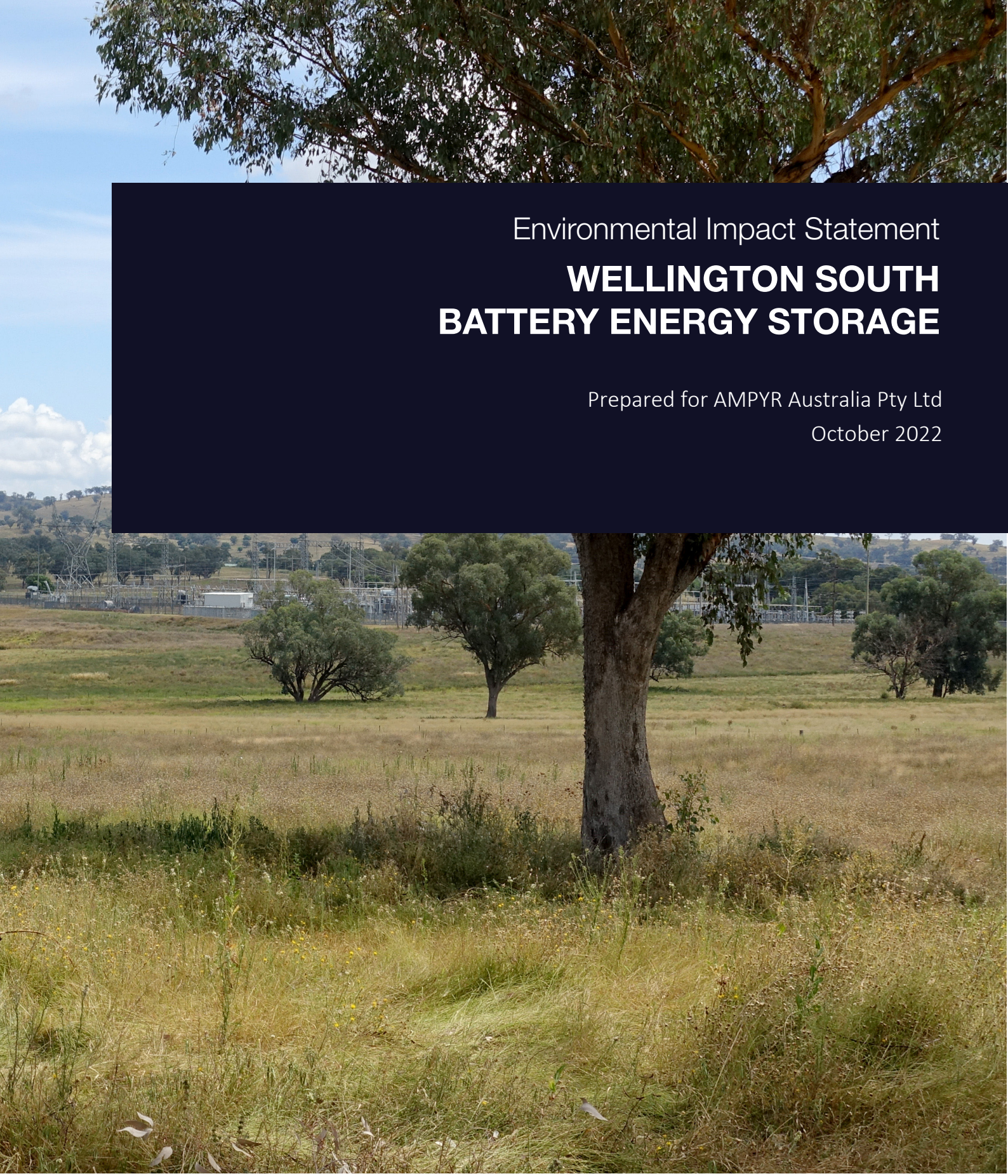

Environmental Impact Statement

WELLINGTON SOUTH BATTERY ENERGY STORAGE

Prepared for AMPYR Australia Pty Ltd

October 2022

AMPYR

Shell ENERGY

EMM creating opportunities

Wellington South Battery Energy Storage System

Environmental Impact Statement

AMPYR Australia Pty Ltd

J210534 RP1

October 2022

Version	Date	Prepared by	Approved by	Comments
V1	13 March 2022	Chris Colusso	Claire Burnes	
V2	1 June 2022	Chris Colusso	Claire Burnes	
V3	3 June 2022	Chris Colusso	Claire Burnes	
V4	8 September 2022	Chris Colusso	Claire Burnes	
V5	25 October 2022	Chris Colusso	Claire Burnes	

Approved by

Claire Burnes
Associate Environmental Engineer
25 October 2022

Ground floor 20 Chandos Street
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St Leonards NSW 1590

Certification

For submission of an environmental impact statement (EIS) under Part 4, Division 4.1 of the NSW Environmental Planning and Assessment Act 1979.

EIS prepared by

Christopher Colusso
BPEc

Claire Burnes
BEng(Env)(Hons)

Applicant

Applicant name: AMPYR Australia Pty Ltd

Applicant address: 36–38 Young Street, Sydney NSW 2000

Description of development

Construction and operation of a battery energy storage system, incorporating a substation and ancillary infrastructure, with a discharge capacity of 500 megawatts (MW) and a storage capacity of 1,000 megawatt hours. The facility will connect to the neighbouring Wellington Substation, operated by TransGrid, by way of an overhead or underground 330 kilovolt transmission line. Excess energy will be taken by the battery during periods of excess supply and inject energy back into the electrical grid during periods of peak demand. The battery will operate 24/7 and will have a design life of 20 years. Construction of the facility will occur over a period of between 12–18 months.

Land to be developed

6773 Goolma Road, Wuuluman (battery energy storage system and transmission line) described as Lot 32 DP 622471 and 6909 Goolma Rd, Wuuluman (transmission line) described as Lot 1 DP 1226751.

Certification

We certify that the contents of this EIS have been prepared in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979*, clause 190 of the Environmental Planning and Assessment Regulation 2021 and the NSW Department of Planning, Industry and Environment Secretary's Environmental Assessment Requirements issued for the development. To the best of our knowledge, it contains all available information that is relevant to the environmental assessment of the development to which the statement relates. The information contained in this EIS is neither false nor misleading.

Christopher Colusso

Environmental Planner

25 October 2022

Claire Burnes

Associate

25 October 2022

Executive Summary

ES1 Introduction

AMPYR Australia Pty Ltd (AMPYR) and Shell Energy Operations Pty Ltd (Shell) propose to develop and operate the Wellington Battery Energy Storage System (the project), located approximately 2.2 km north-east of the township of Wellington in the Dubbo Regional Council local government area (LGA) and within the New South Wales (NSW) Government declared Central-West Orana Renewable Energy Zone (CWO REZ). The regional setting and local context are shown in Figure ES1 and Figure ES2.

The project incorporates a large-scale battery energy storage system (BESS) with a discharge capacity of 500 megawatts (MW) and a storage capacity of 1,000 megawatt hours (MWh), along with connection to the Wellington substation (and associated upgrade works) and associated ancillary infrastructure to facilitate transfer of energy to and from the electrical grid.

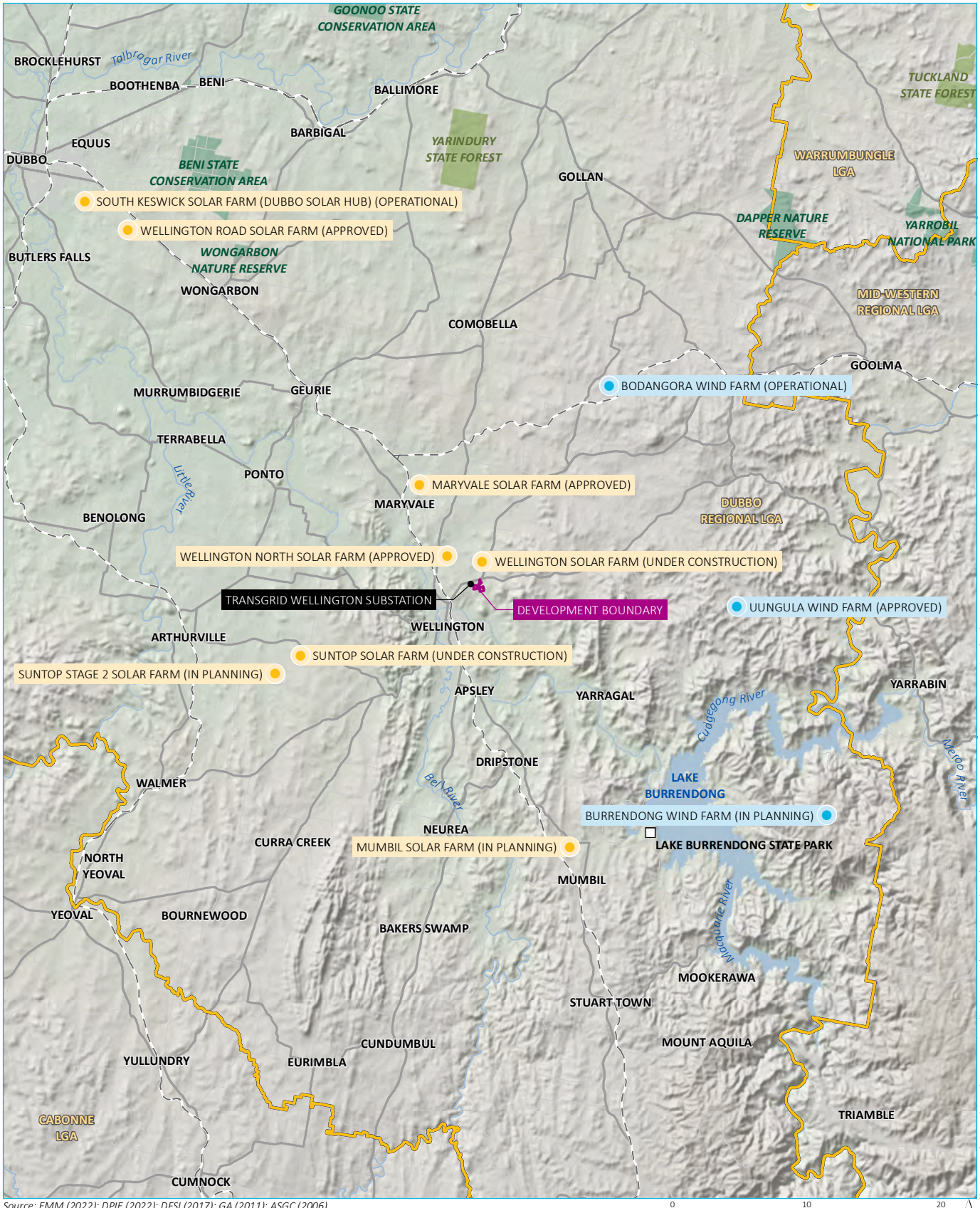
This environmental impact statement (EIS) accompanies a state significant development (SSD) application for the project.

ES2 Strategic context

The National Electricity Market (NEM) is undergoing significant transformation from a centralised system of large fossil fuel (coal and gas) generation towards an array of smaller scale, widely dispersed wind and solar generators, with record levels of wind and solar generation in 2020 and forecast growth to increase in the next 20 years. This presents reliability and security challenges to the NEM, in particular due to the weather-dependent nature of wind and solar generators, which makes their output variable and sometimes unpredictable. 'Firming' capacity is therefore required in the NEM to fill supply during gaps and where generation is intermittent, which can be provided by BESS facilities by storing excess energy generated during times of low demand and injecting energy back into the grid during periods of peak demand. BESS facilities also function to smooth out price differences during peak and off-peak periods and potentially balance out price increases during unanticipated outages thereby putting downward pressure on spot prices; and can improve the average emissions intensity of the NEM by providing more capacity for renewable energy generators.

Once operational, the project will be one of the largest battery projects in the State, contributing up to 1,000 MWh of storage capacity in the NEM. It will support new and existing renewable energy projects and may also provide various system services and network support. The project will also provide broader security to the grid by providing back-up power during network disruptions.

The project is consistent with and supports the Commonwealth and State renewable energy, electricity and emissions reductions policies, strategies and objectives. It is located within the first of numerous identified REZ's across the State and will complement nearby existing and proposed renewable energy generation assets to be delivered as part of the CWO REZ, by smoothing out fluctuations in electricity supply from these new intermittent power sources, and providing system security and other network services.



Source: EMM (2022); DPIE (2022); DFSI (2017); GA (2011); ASGC (2006)

0 10 20 km

GDA 1994 MGA Zone 55

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KEY

- Development boundary
- Lake Burrendong State Park
- Rail line
- Major road
- Minor road
- River
- Named waterbody
- Local government area
- NPWS reserve
- State forest

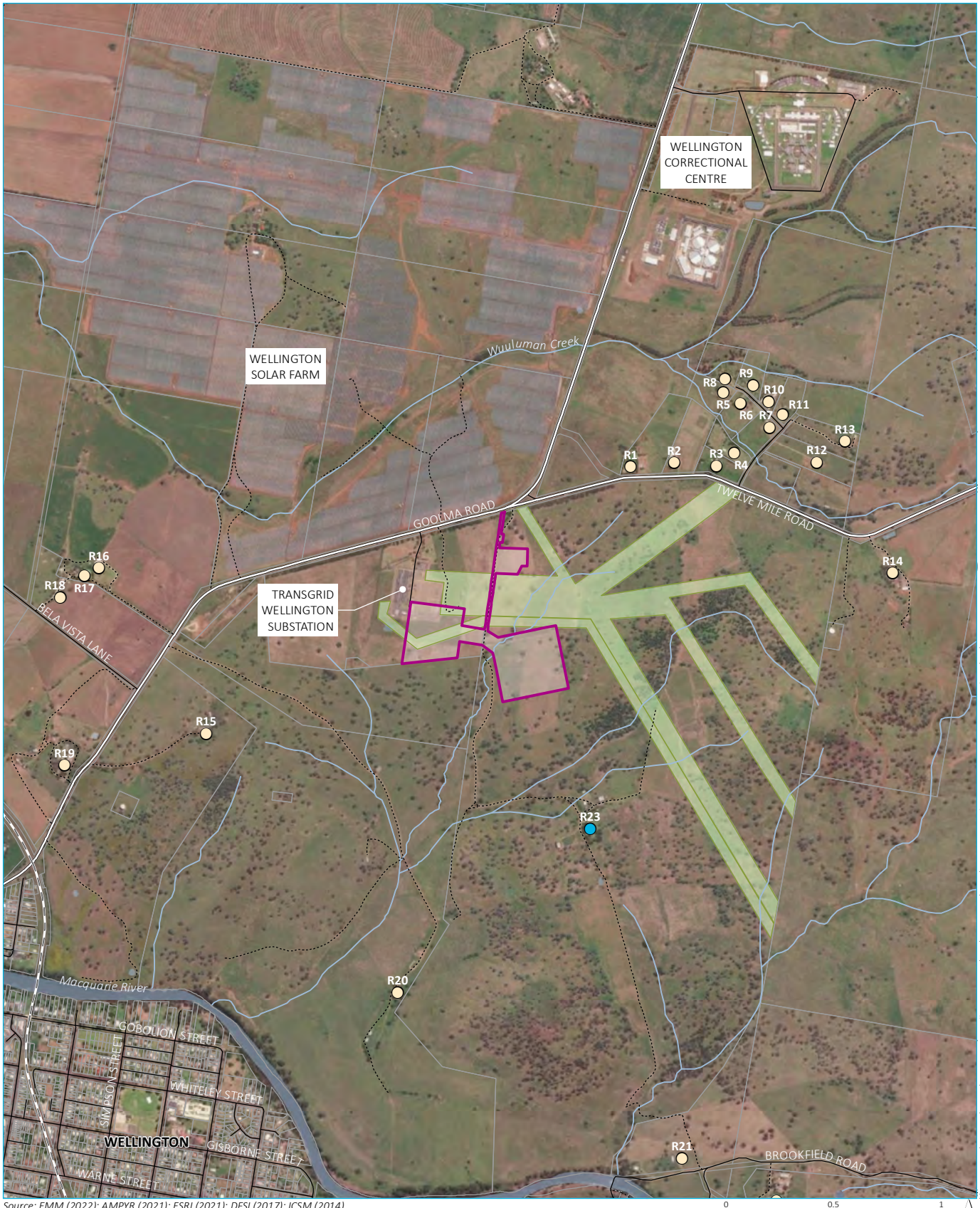
Renewable energy project

- Solar farm
- Wind farm

Regional setting

Wellington Battery Energy Storage System
Environmental impact assessment
Figure ES1

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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GDA 1994 MGA Zone 55

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary
- Freehold easement

Receivers

- Non-project residential receivers
- Project participating landowner

Local context

Wellington Battery Energy Storage System
Environmental impact assessment
Figure ES2

EMM creating opportunities

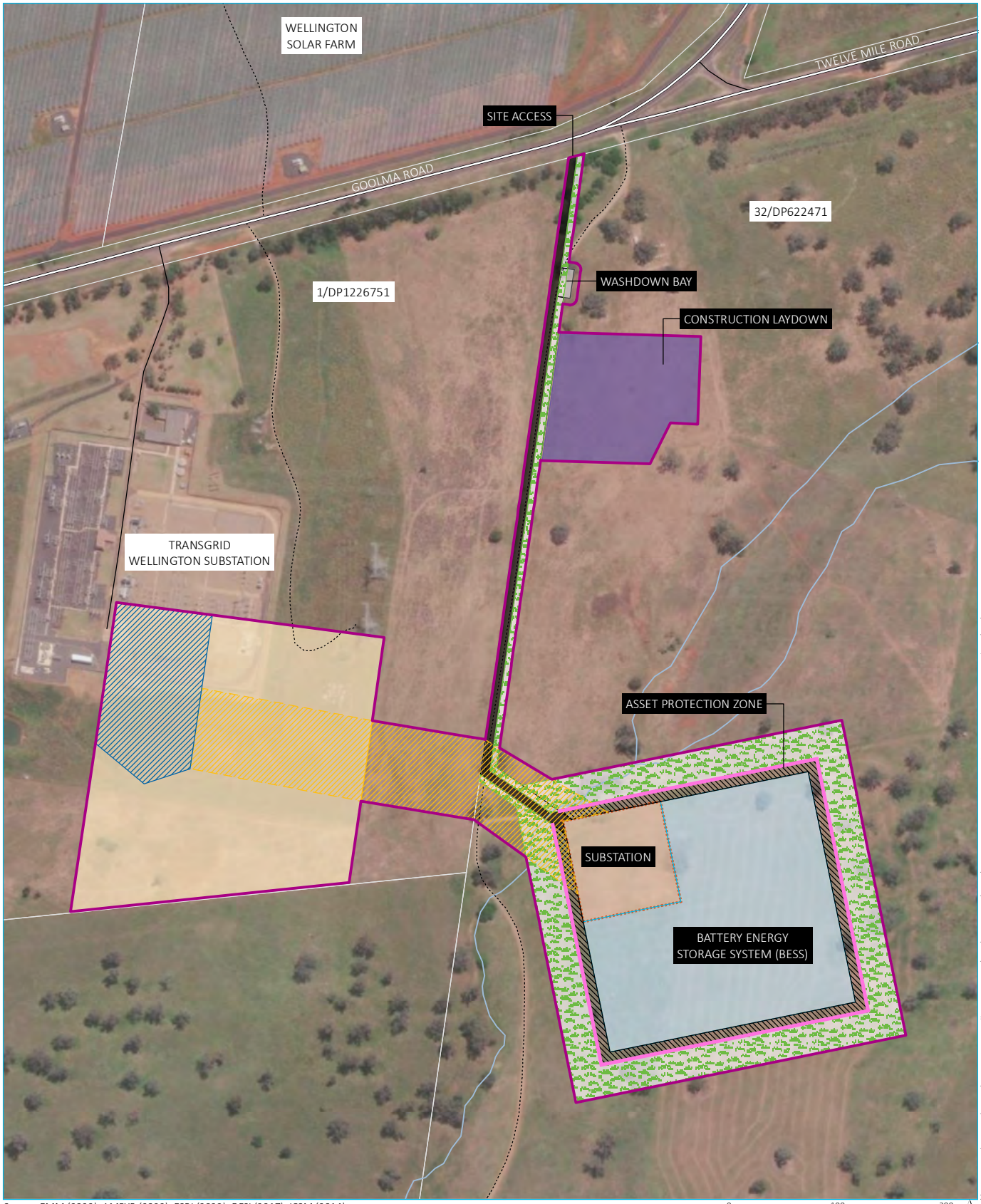
ES3 The project

The project will comprise the following components:

- Construction and operation of electrical infrastructure, including:
  - lithium-ion (Li-ion) batteries inside battery enclosures;
  - power conversion systems (PCS) incorporating inverters and transformers;
  - an aboveground or underground transmission line and connection to the switchyard of the Wellington Substation and associated easement;
  - an on-site substation comprising two 330 kilovolt (kV) transformer bays and ancillary infrastructure; and
  - cabling and collector units.
- Upgrade of the TransGrid Wellington Substation, which may include installation of an additional 330 kV switch bay with power transformers, including switchyard bench extension to the south of the existing bench and relocation of security fencing.
- Construction/upgrade and maintenance of ancillary infrastructure and mitigative features, including:
  - an upgrade to the existing site access (currently at the intersection of Goolma Road and Twelve Mile Road) to facilitate safer connection to roadway network and to facilitate the entry of larger construction vehicles;
  - upgrades to existing access tracks;
  - control and office building and associated parking;
  - drainage and stormwater management;
  - security fencing, lighting and closed-circuit television;
  - connection to utilities (telecom, sewerage, etc);
  - an Asset Protection Zone (APZ);
  - noise attenuation/acoustic barriers (wall/retaining wall and batter or earth mounds) four metres in height along all sides of the BESS facility; and
  - planted landscaping around the BESS facility.

The project layout showing these components is presented in Figure ES3.

Construction of the project will be Monday to Friday 7.00 am to 6.00 pm and Saturday 8.00 am to 1.00 pm. The BESS will operate 24 hours a day, 7 days a week and be operated remotely. The operation of the project is expected to commence from 2024 for a period of approximately 20 years, at which point the project will be extended or decommissioned. Once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and removed from the site.



Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017); ICSM (2014)

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GDA 1994 MGA Zone 55

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KEY

- Development boundary

Project components

- Indicative asset protection zone (10 m)
- Indicative transmission connection corridor
- Indicative TransGrid substation upgrade core infrastructure area
- Indicative TransGrid substation upgrade disturbance area
- Battery Energy Storage System (BESS) (battery rows offset at 6 m spacing and setback from substation)
- Substation
- Washdown bay
- Construction laydown
- Indicative landscaping (post construction)
- Access road
- Indicative location of noise bund

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Project overview

Wellington Battery Energy Storage System
Environmental impact assessment
Figure ES3

EMM creating opportunities

ES4 Engagement

AMPYR and Shell have been actively engaging with the community and stakeholders since planning for the project commenced in 2021, including through a project phone line and email address, dedicated project website, letterbox drops, community newsletters and direct consultation with stakeholders through briefings and community information sessions.

Community and stakeholder engagement has been conducted specifically for the project, including with local, State and Commonwealth government agencies, Registered Aboriginal Parties, the local community and neighbours. Two community information sessions were held at Wellington on 22 February 2022 and online on 26 February 2022.

Matters raised in engagement activities have been considered in the preparation of the EIS. AMPYR and Shell will continue stakeholder engagement activities to ensure matters raised by the community and other stakeholders are understood and addressed. Future engagement and consultation activities for the project will include public exhibition of this EIS, preparing a Submissions Report responding to the submissions received during the public exhibition, and further community information sessions.

ES5 Assessment of impacts

A range of detailed technical assessments were prepared by technical specialists in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) (now Department of Planning and Environment (DPE)) on 1 October 2021 (SSD-27014706) (Appendix A), relevant legislation, policies and guidelines. This EIS describes the assessment methods used, the existing environment, the predicted impacts of the project and the proposed management measures that will be implemented by AMPYR and Shell.

ES5.1 Biodiversity

A BDAR (Appendix E) has been prepared to inform this EIS, which was prepared in accordance with the BAM (DPIE 2020d) and biodiversity related SEARs issued by DPIE.

The iterative design and assessment process that was adopted in developing the project has ensured the avoidance and minimisation of impacts to biodiversity values as far as practicable. Residual biodiversity impacts include:

- loss of 9.437 ha of native vegetation and associated habitat for fauna species;
- loss of 9.437 ha of White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion CEEC listed under the BC Act;
- loss of seven hollow-bearing trees; and
- indirect impact to a further 1.37 ha of native vegetation, associated habitat for fauna species and the White Box grassy woodland CEEC.

One Serious and Irreversible Impacts (SAII) entity occurs within the subject land; Box Gum Woodland. The SAII entity has been assessed in accordance with the BAM.

The project requires 27 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 42 species credits for the Superb Parrot and 66 species credits for Key's Matchstick Grasshopper. Key's Matchstick Grasshopper is assumed present in the BDAR due to the late introduction of the species into the assessment as a result of BAM data updates. The proponent intends to conduct further surveys for Key's Matchstick Grasshopper and commits to providing an updated BDAR to DPE as part of the Response to Submissions phase of the project. AMPYR will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The project is not expected to result in significant impacts to the Superb Parrot. A referral under the EPBC Act is not required, as the project is not considered to be a controlled action.

ES5.2 Aboriginal heritage

An Aboriginal cultural heritage assessment (ACHA) was prepared by EMM in support of the EIS (refer Appendix F). The ACHA documents the results of archaeological investigations undertaken to identify the extent and significance of any physical remains and intangible values of past Aboriginal visitation, use and occupation within the project area.

The ACHA was prepared in response to the SEARs and in general accordance with the Code of Practice for Archaeological Investigation in NSW (DECCW 2010), and guided by the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011).

Aboriginal consultation for the ACHA has conformed with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010) and included provision of information on registered Aboriginal parties (RAPs), and notification of field survey associated with the project.

The consultation process initially identified 19 Aboriginal stakeholder organisations with potential interest in the project area. Following a notification process, six responded to be registered for subsequent consultation through the project, including the Wellington Local Aboriginal Land Council (LALC) and a number of Wiradjuri traditional owner groups. The one-day field program included the participation of three of these organisations; Gallanggabang Aboriginal Corporation, Wellington Valley Wiradjuri Aboriginal Corporation, and Binjang Wellington Wiradjuri Heritage Survey.

Based on the regional information and characteristics of the project footprint, the ACHA concluded that it is unlikely that substantial cultural materials are present within the project area as it lacks the natural and topological features associated with long term occupation.

The project is unlikely to impact Aboriginal cultural material to a traceable level through archaeological investigation. Notwithstanding there is always residual potential for unexpected finds to be uncovered during broad scale earthworks associated with project construction. As such, mitigation measures have been proposed for implementation in the event that unexpected Aboriginal objects are uncovered in the project area.

ES5.3 Noise and vibration

A noise and vibration impact assessment (NVIA) was prepared by EMM in support of the EIS (refer Appendix K). The NVIA has been prepared in response to the SEARs and in general accordance with the relevant guidelines.

The NVIA predicts that construction noise levels from the project may exceed noise management levels (NMLs) at a number of assessment locations by a negligible level (1–2dB). An exceedance of 6 dB above NML at R1 closest to the site is predicted in the absence of specific additional mitigation. Noise monitoring during construction will be considered to determine if actual construction noise levels are above NMLs. Subject to the measured level of exceedance, availability of feasible and reasonable noise mitigation and management measures will be determined.

The potential for vibration impacts on residents and vibration sensitive structures near construction has been assessed. The nearest residence to construction activity is assessment location R1 which is approximately 570 m away from closest construction activities. This assessment location is outside of the safe working distances of likely plant, required to maintain acceptable human response and structural vibration levels. Vibration impacts from construction at residential assessment locations are therefore highly unlikely.

With the effective management and incorporation of mitigation and management measures, construction noise and vibration emissions from the project can be managed to minimise impacts.

Operational noise has been assessed under adverse weather conditions and considering the actual operational utilisation of the BESS. Noise mitigation measures have been included in the modelling following the outcome of preliminary noise modelling indicating noise exceedances. Following the implementation of all feasible and reasonable mitigation options, the modelling has demonstrated noise compliance can be achieved for all assessment locations during day and night NPfI assessment periods. During the evening assessment period the potential for a moderate exceedance of 5dB was predicted for R1 whilst a negligible 1 dB exceedance was identified for R15. All feasible and reasonable mitigation has been considered for R15, and considering the predicted level is negligible (1 dB) over the PNTL, not further mitigation is proposed.

To address the residual noise exceedance at R1 negotiations have commenced between the applicant and the landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10 dB or more) below the relevant external PNTL and will be documented in the form of a negotiated agreement.

The potential for road traffic noise impacts on public roads due to project traffic has been assessed in accordance with the NSW Road Noise Policy (RNP) for peak site traffic movements during the construction period. The assessment has confirmed that road traffic associated with the construction of the facility will not increase existing road traffic noise levels by more than 2dB in accordance with the RNP.

With the effective management and incorporation of mitigation measures, noise and vibration emissions from the project can be designed to satisfy relevant guidelines, standards and policies.

ES5.4 Historic heritage

A historic baseline assessment (HBA) was prepared by EMM in support of the EIS (refer Appendix G). The purpose of the HBA was to investigate any archaeological potential, including built heritage items of historical heritage significance related to European occupation. The HBA included a high-level desktop investigation to identify the potential historical constraints associated with the project area and a field survey to verify the results of the desktop investigation and to identify if there are any sites or items of historical significance within or near the boundary of the project area.

The HBA was prepared in general accordance with the NSW Heritage Manual and to address the relevant SEARs concerning historic heritage.

The results of the HBA indicate that the risk of disturbing relics is low. The background research and fieldwork indicated the built structures of concern in the locality were located outside the project area to the south. The pasture has been utilised for grazing and crops since the 1830s and although the landscape remains largely unchanged from that time, it does not hold any historical significance.

ES5.5 Hazard and risk

A preliminary hazard analysis (PHA) was prepared by Sherpa Consulting (refer Appendix N). It summarises potential hazards and risks associated with the project and details measures which, when implemented, will reduce these hazards and risks to acceptable levels. The scope of the PHA considered the proposed infrastructure associated with the project including battery enclosures and electrical conversion systems (eg inverters and transformers), the on-site substation, transmission line connection infrastructure, upgrades of the existing Wellington substation and ancillary infrastructure.

The PHA was prepared in response to the SEARs and in accordance with the relevant guidelines.

Potential hazards associated with operation of the project were identified through a hazard identification process involving a review of controls detailed in the brochures, product specification and fire safety design documents for prospective technology providers. Further, a literature review of past incidents involving similar BESS systems and previous risk assessments for similar BESS systems completed by Sherpa was undertaken, along with consultation with AMPYR.

The assessment identified numerous scenarios/events with potential for offsite impacts, which were subject to qualitative risk analysis in accordance with the Multi-level Risk Assessment Guideline. Of the 14 events identified, all were rated as “Very Low” risks except for one “Medium” risk event. All identified events are not expected to have significant offsite impacts. Based on the study risk acceptance criteria, the risk profile for the project is considered to be tolerable.

The analysis finds that the project is compliant with the HIPAP 4 qualitative risk criteria.

ES5.6 Land resources

A land, soils and erosion assessment (LSEA) was prepared by EMM to identify and assess potential land capability, soil erosion, sedimentation and rehabilitation impacts associated with project construction and operation (refer Appendix H). In response to the SEARs, it also provides an assessment of the project on the agricultural resources of the site and on agricultural production.

The LSEA identified a range of potential impacts to soils during construction of the project, including through topsoil loss or poor soil handling and management practices and soil compaction processes, which can be effectively mitigated through implementation of a range of recommended management and mitigation measures.

Agricultural productivity of the land within the project area in its current use (livestock grazing) and the proposed change of use (electricity infrastructure) was estimated. Given the small disturbance area for the project, the LSEA concluded that the project would not result in a significant loss of agricultural land value based on annual productivity, and impacts are anticipated to be limited primarily to the direct project area with minimal impact to adjacent lands.

ES5.7 Social

A social impact assessment (SIA) was prepared by EMM in accordance with relevant SEARs and guidelines (refer Appendix O).

The SIA was based on a risk-based framework, whereby potential social impacts have been assessed based on the change to, or perceived change to the social and biophysical environment as understood through the project and SIA field study program. These include benefits and negative social impacts. Key potential impacts were identified to include those related to way of life (amenity); community (community investment, social cohesion and resilience); health and wellbeing (public safety relating to road traffic and fire hazards); livelihood (employment and training opportunities); and cumulative impacts (rental housing, employment and traffic).

Mitigation and management strategies have been proposed for each of the identified potential social impacts to minimise negative consequences and to maximise social benefits for the local community. Performance indicators should be developed by AMPYR for each mitigation and enhancement measure in consultation with stakeholders and should be monitored throughout the project life span by AMPYR.

An adaptive approach is proposed allowing AMPYR to manage and respond to changing circumstances and new information over time through ongoing monitoring and periodic review of mitigation strategies allowing for modification if required and appropriate. This adaptive approach will ensure that the management of social impacts identified in the SIA will result in minimising negative social consequences and maximising social benefits for the local community.

ES5.8 Traffic and transport

A traffic impact assessment (TIA) has been prepared by EMM (refer Appendix L) in accordance with the NSW Government's (RTA) *Guide to Traffic Generating Developments* (2002) and the SEARs.

The TIA reviewed and assessed project-related construction daily and peak hour traffic volumes in consideration of the potential for staged or single phase construction, along with cumulative traffic volumes along the existing road network to determine whether there is sufficient road network capacity and to ensure the existing road network will be adequate to accommodate the additional traffic movements generated by the project.

Vehicle movements will take place primarily on Goolma Road. Construction of the project will occur in a single stage over a period of 12–18 months, or over two stages each between 12–18 months, commencing from 2023. The worst case construction traffic scenario is associated with the single stage construction, which at its peak is expected to generate up to 100 construction personnel.

Construction traffic includes passenger vehicles transporting constructions workers and heavy vehicles transporting project equipment. There will be an average of up to 100 passenger vehicles and 60 heavy vehicles per day, and a maximum of 80 passenger vehicles and 30 heavy vehicles during the peak hour, in the construction works phase. There will be up to 20 oversize/overmass vehicles during the construction works phase and relevant permits will be acquired for the project prior to mobilisation.

It was identified that development in vicinity of the project has the potential to generate cumulative traffic impacts with the project. The greatest potential for cumulative impacts of future projects and the project in relation to traffic are associated with the following two projects, which have the potential to have construction periods that overlap with the project:

- Wellington North Solar Farm (SSD 8895); and
- Uungula Wind Farm (SSD 6687), including associated upgrades to the Goolma Road/Twelve Mile Road intersection and Twelve Mile Road.

In consideration of the potential timing for construction of these two projects, the TIA considered a cumulative traffic impact assessment associated with construction of the Wellington North Solar Farm and Uungula Wind Farm developments concurrently with construction of the project. This allows for a conservative assessment to determine the worst possible scenario, in terms of traffic impacts due to this project.

In addition, the worst case construction traffic scenario was considered for the project, which is represented by a single stage construction scenario (as opposed to a staged construction scenario, whereby daily and peak hourly construction traffic generation would be a smaller percentage of the single stage construction scenario traffic generation).

The cumulative traffic impact assessment identified that the mid-block capacity of the Goolma Road section west of the site access would deteriorate from LOS B to LOS D. However, this will only be during the scenario where peak construction activity overlaps with the nearby development traffic. The level of service will return to the baseline traffic conditions once the peak construction period is over.

Sight distance to the right of the site access does not meet the minimum requirement as stipulated in the *Austroads Guide to Road Design*. Recommended mitigation measures include removing the existing roadside vegetation (a single tree) which currently restricts the sight distance along with implementation of construction stage traffic management measures such as warning signs. These would be beneficial to not only the site related traffic, but also general traffic passing through this section of Goolma Road.

As part of the Uungula Wind Farm development, the existing Goolma Road/Twelve Mile Road intersection will be relocated approximately 400 m to the north which will improve traffic safety for all motorists.

Austroads intersection turn treatment warrants were conducted for left and right turning traffic from Goolma Road into the relocated site access. The assessment revealed that for the cumulative traffic impact assessment, AUL(S) and CHR type turn treatments will be required.

An auxiliary short left turn bay AUL(S) and a short right turn bay CHR(S) is recommended. The CHR(S) is recommended due to the fact that a longer right turn bay will not be needed once the construction period is over. For the operational period, a longer right turn bay is not required.

ES5.9 Visual

A visual impact assessment (VIA) was prepared by EMM to support this EIS (Appendix J) in accordance with the relevant governmental assessment requirements and the SEARs.

The VIA assessed impacts from ten representative viewpoints surrounding the project area. The representative viewpoints were selected based on the following criteria:

- proximity to the project;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- local topography; and
- presence of vegetation with potential to provide screening.

The representative viewpoints were assessed to demonstrate the potential visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, the BESS and substation infrastructure will be relatively shielded from view from most of the viewpoints. The exception would be the addition of transmission towers, which will be positioned next to existing towers. Even though the proposed BESS and substation has the potential to alter the existing visual amenity of the area, the site selected is adjacent to an existing substation, which has already introduced electrical transmission infrastructure into the landscape. In this context, the visual landscape will not be altered significantly with proposed infrastructure placed adjacent to similar infrastructure that are already a part of the visual character of the area.

The project design and placement has evolved to minimise visual impacts where possible. This includes the alignment of the access drive, location of the BESS compound and the landscape screening. Nonetheless, the project will have the potential for visual impacts on the landscape. These visual impacts will occur during the construction and operational stages of the project.

The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from all ten viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the proposed transmission towers, the impact assessment predicts:

- a moderate visual impact from Viewpoint 4 (R15), which reduces to a low impact after mitigation through landscaping around the BESS compound; and
- low visual impacts from the remaining viewpoints.

Landscape screening is proposed around the BESS compound and along the eastern side of the access road to mitigate visual impacts at the following:

- north and east of the site – the proposed landscaping will screen views from the north and east, which includes views from R1, R2, R3, R4, Goolma Road, and Twelve Mile Road;
- west of the site – the proposed landscaping will screen views from the east, including R15; and
- south of the site – the proposed landscaping will screen views from the south, including R23.

Visual impacts from most of the viewpoints are limited to the proposed transformer towers and the transmission towers. Because of the hilly topography and trees existing in the landscape most receptors outside of a 1 km radius of the project site will not see the BESS compound.

ES5.10 Surface water and flooding

A water assessment (WA) was prepared by EMM (Appendix M) with reference to relevant guidelines and policies and the SEARs.

The project site lies predominantly within the catchment of an ephemeral second order watercourse, a tributary to the Macquarie River located immediately upstream of the township of Wellington. The project site falls within the Lachlan Fold Belt geological structure. Bedrock within the structure consists of felsic volcanics, shales and sandstone fractured rocks which are overlain by colluvial deposits and shallow alluvium. Two groundwater systems are present near the project site, a shallow system residing in the shallow colluvium and unconsolidated sediments; and a deeper system associated with the underlying fractured rock. Groundwater levels within the fractured rock aquifer range from 10–30 metres Below Ground Level (mBGL) and levels within the colluvium/alluvium are likely to vary depending on the depth to bedrock. Flow direction of both systems are expected to be southerly toward the Macquarie River. Several low potential terrestrial Groundwater Dependant Ecosystems (GDEs) surround the site with no aquatic GDEs mapped within reasonable proximity to the development.

A conceptual approach to water management for the site was developed to inform the WA and will be subject to further design development as part of future detailed design. The proposed water management approach was developed with consideration of best practice water management objectives.

Prior to construction, temporary soil and water management measures would be detailed and documented as part of the overall construction environmental management plan (CEMP) to address temporary risks to water quality and drainage during the construction phase and will also reflect industry best practice.

No impacts to groundwater resources are anticipated for the project due to limited ground disturbance and minor licenced groundwater take during construction. Predicted residual impacts to surface water resources are described in terms of stormwater flow management, water quality, and impacts to watercourses and the downstream receiving environment. This assumes implementation of the proposed water management approach.

During construction the key risks to surface water are associated with clearing, ground disturbance, earthworks, compaction of soils and installation of infrastructure. This may lead to an increase in site runoff potential and exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. Contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities could also adversely impact water quality. Potential impacts during construction are considered minor and manageable with implementation of temporary water and soil management measures that will form part of the CEMP.

During operation the key risks to surface water are associated with an increase in site runoff potential and stormwater pollutant loads. This may lead to an increase in peak flow rates leaving the site and reduction in water quality in receiving watercourses. However, a range of measures to mitigate potential increases in peak flow rates and pollutant loads form part of the proposed water management approach for the project. On this basis, potential adverse impacts during operation are not anticipated.

Any flood impacts associated with the development are anticipated to be localised and remain within the project site. Potential adverse impacts to watercourses further downstream of the site, including the Macquarie River, are not anticipated.

ES5.11 Other impacts

The EIS has considered other potential impacts related to air quality, contamination and waste. Potential impacts are considered to be unlikely/low and a range of mitigation measures have been proposed that will effectively manage these aspects during construction and operation of the project.

ES6 Evaluation of the project

ES6.1 Objects of the EP&A Act and biophysical, economic and social impacts of the development

An assessment of the consistency of the project with the objects set out in Clause 1.3 of the *Environmental Planning and Assessment Act 1979* (EP&A) Act found that it will meet each relevant object. It will also meet the principles of ecologically sustainable development outlined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

ES6.2 Site suitability

The site is considered a highly suitable location for the project, being located within the CWO REZ; on suitably zoned land; immediately adjacent to the Wellington TransGrid substation – the proposed point of connection to the electricity grid; is compatible with existing land uses and zonings, including agricultural land use and renewable energy projects, along with proximity to major transport links for site access; and has been sited to largely avoid impacts to sensitive environmental features and the surrounding community.

ES6.3 Project justification

ES6.3.1 Project need

The project is consistent with relevant Commonwealth, State and local strategic plans and polices, in particular the NSW Electricity Infrastructure Roadmap (DPIE 2020a) which identifies that by mid-2030, NSW could need up to 2.3 GW of storage throughout the network. The project will contribute to storage requirements by delivering a battery capable of providing a peak capacity of up to 500 MW that can be dispatched as required to meet demand.

ES6.3.2 The environment

The project has been designed to avoid and minimise impacts where reasonable and feasible. The principles of avoidance and minimisation were implemented through the siting of infrastructure which involved numerous technical specialists. Throughout the development of the project design, AMPYR and Shell have sought to optimise the project in a manner that considers the surrounding environment, avoids or minimises impacts at sensitive locations, and maintains existing natural features where present.

Management plans will be prepared for the construction and operation of the project. These plans will be regularly reviewed and updated in accordance with the requirements of approvals and licencing.

ES6.3.3 The community

Specific engagement regarding the project has been undertaken as part of preparing this EIS. Ongoing engagement will continue throughout the project.

To date, feedback from the community has been varied and includes both positive and negative views on a range of topics.

Local people have a range of views, with most people recognising the benefits of the project to the state and the benefits that will flow to the region through the project's construction. Some raised concern about how environmental impacts will be managed – in particular noise and hazards. This concern was mostly from residents in the township of Wellington.

Stakeholders raised concern around the potential for cumulative traffic and transport impacts and social impacts.

All of these issues have been considered and assessed within the EIS. Consultation on the project will continue through the EIS and approvals process, and beyond should approval be granted.

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Appendices

Tables

Figures

Photographs

1 Introduction

1.1 Overview

AMPYR Australia Pty Ltd (AMPYR) and Shell Energy Operations Pty Ltd (Shell) propose to develop and operate the Wellington Battery Energy Storage System (the project). This involves the development of a large-scale battery energy storage system (BESS) with a discharge capacity of 500 megawatts (MW) and a storage capacity of 1,000 megawatt hours (MWh). The project also incorporates an on-site substation and connection infrastructure to facilitate transfer of energy to and from the electrical grid, along with associated ancillary infrastructure. The project will be operated by Shell Energy Australia (Shell). The project is described in detail in Chapter 3.

The site proposed to be developed is located within the Dubbo Regional Council local government area (LGA) at 6773 Goolma Road at Wuuluman, on land zoned RU1 Primary Production and SP2 Infrastructure under the Dubbo Local Environment Plan (LEP). It will be located directly adjacent to the TransGrid owned Wellington Substation and is approximately 2.2 km north-east of the township of Wellington and 44 km south-east of the township of Dubbo. The project will incorporate either overhead or underground transmission line and upgrade works to Wellington substation in the adjoining TransGrid owned landholding (Lot 1 DP 1226751).

The regional setting is presented in Figure 1.1; the site and its surrounding local context is shown in Figure 1.2; and land zoning is illustrated in Figure 1.3.

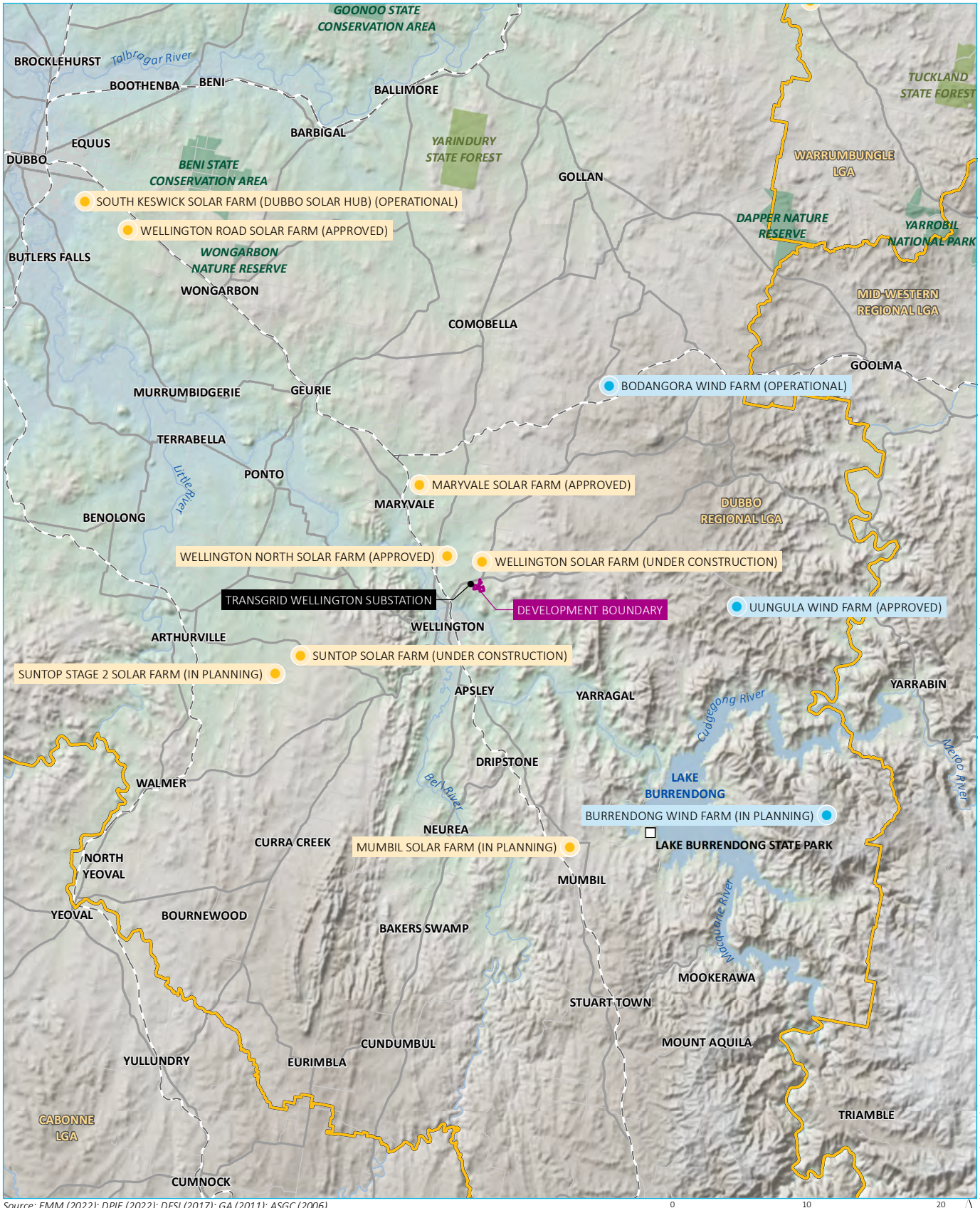
The site is located within the New South Wales (NSW) Government declared Central-West Orana Renewable Energy Zone (CWO REZ) and will complement nearby existing and proposed renewable energy generation assets, including the Wellington Solar Farm (located opposite Goolma Road), Uungula Wind Farm and the proposed 3 GW of additional generation to be delivered as part of the CWO REZ, by smoothing out fluctuations in electricity supply from these new intermittent power sources, and providing system security and other network services. In operation, the project will be one of the largest battery storage projects in NSW and will contribute to the overall storage capacity and reliability of the National Electricity Market (NEM). The project also supports state and Commonwealth emission commitments by facilitating renewable energy input into the grid network.

This environmental impact statement (EIS) has been prepared by EMM Consulting Pty Limited (EMM) on behalf of AMPYR and Shell to support an application for development consent under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The project is classified as State significant development (SSD) under the EP&A Act as it is within the meaning of 'electricity generating works' (clause 20) under Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021.

This EIS addresses the specific requirements provided in the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) (now Department of Planning and Environment (DPE)) on 1 October 2021 (SSD-27014706) (Appendix A).

The EIS has been prepared in general accordance with the *State Significant Development Guidelines – preparing an environmental impact statement* (DPIE 2021a), *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2021b), *Undertaking Engagement Guidelines for State Significant Projects* (DPIE 2021c), and the *Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021d). It has also been prepared in accordance with the form and content requirements specified in clause 190 of the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

The primary objective of this EIS is to inform the public, government authorities and other stakeholders about the project and the measures that will be implemented to mitigate, manage and or monitor potential impacts, together with a description of the residual social, economic and environmental impacts.



Source: EMM (2022); DPIE (2022); DFSI (2017); GA (2011); ASGC (2006)

0 10 20 km

GDA 1994 MGA Zone 55

N

KEY

- Development boundary
- Lake Burrendong State Park
- Rail line
- Major road
- Minor road
- River
- Named waterbody
- Local government area
- NPWS reserve
- State forest

Renewable energy project

- Solar farm
- Wind farm

Regional setting

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 1.1

EMM creating opportunities

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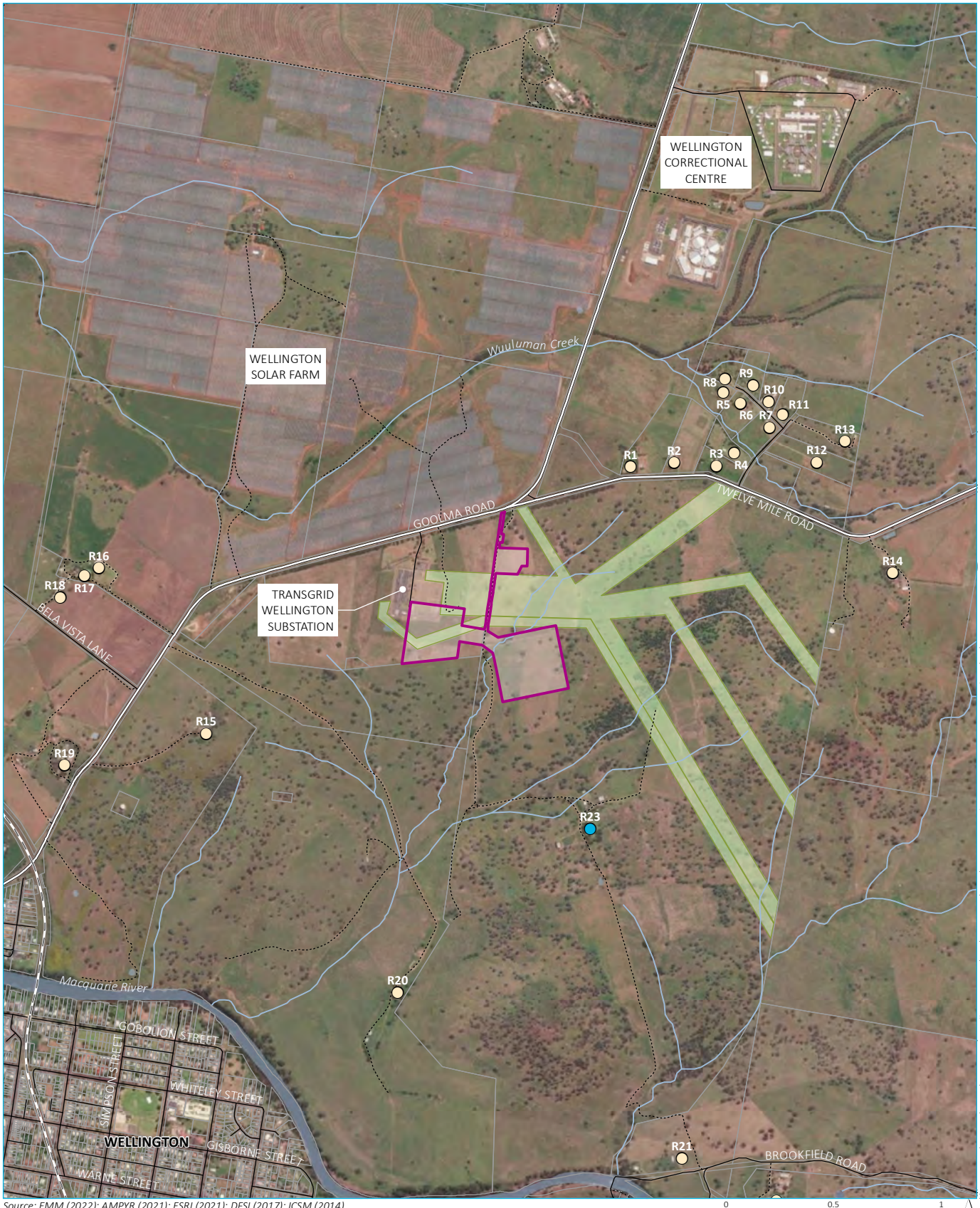

Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary
- Freehold easement

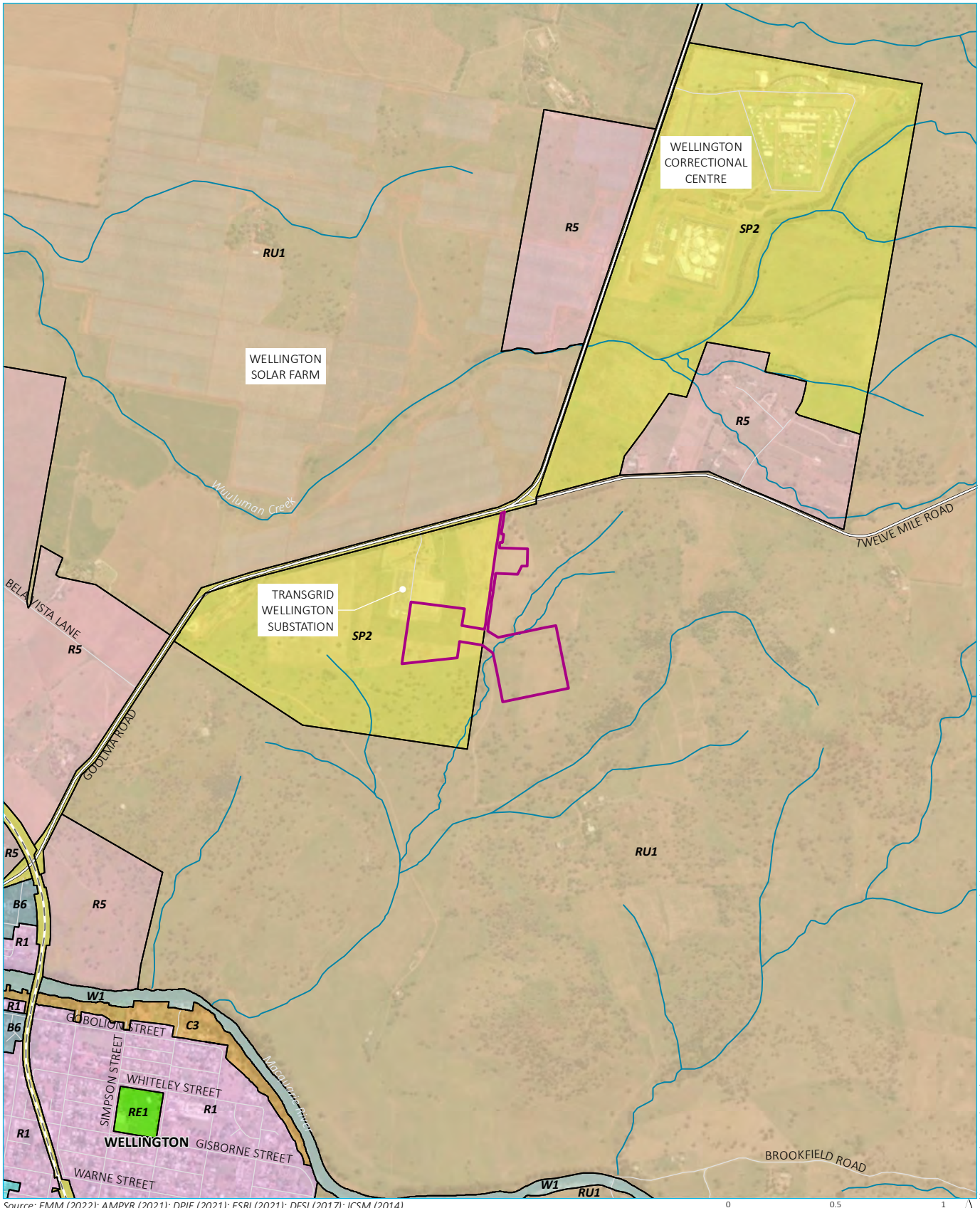
Receivers

- Non-project residential receivers
- Project participating landowner

Local context

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 1.2

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); DPIE (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Watercourse/drainage line

LEP zoning

- B2 | Local Centre
- B6 | Enterprise Corridor
- C3 | Environmental Management
- R1 | General Residential
- R5 | Large Lot Residential
- RE1 | Public Recreation
- RU1 | Primary Production
- SP2 | Infrastructure
- W1 | Natural Waterways

LEP zoning

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 1.3

EMM creating opportunities

1.2 The project

The project will involve the following components:

- construction and operation of the BESS compound, comprising up to 6,200 pre-assembled battery enclosures housing lithium-ion battery packs and related control equipment, and transformers and inverters with a peak maximum generation capacity of 500 MW/1,000 MWh;
- construction and operation of an on-site BESS substation, comprising two 330 kilovolt (kV) transformer bays, 33/0.440 kV auxiliary transformers, and an auxiliary services building to house supporting equipment and systems;
- connection to the adjoining Wellington Substation by way of an underground or aboveground transmission line and associated easement;
- upgrade of the TransGrid Wellington Substation, which may include an additional 330kV switch bay with power transformers, including switchyard bench extension to the south of the existing bench and relocation of security fencing; and
- ancillary infrastructure to facilitate construction and operation of the project, including improvements to the existing access road, a washdown bay for incoming vehicles, and a control and office building.

The project also involves a subdivision in order to separate the BESS from the remainder of the site, which will continue to be used for cropping and grazing.

Construction of the project is expected to commence in May 2023, subject to project approval, labour and equipment availability.

Operation of the project is expected to commence from 2024 for a period of approximately 20 years, at which point the project will be extended or decommissioned. Throughout its operational life, certain components and technologies may be replaced and/or upgraded, however such works are unlikely to be intensive. The BESS will operate 24 hours a day, 7 days a week and be operated remotely, with regular infrastructure maintenance undertaken onsite.

A detailed description of the project is provided in Chapter 3.

1.3 Project objectives

The project has the following key objectives:

- to support the NSW Electricity Strategy (DPIE 2019) and NSW Electricity Infrastructure Roadmap (DPIE 2020a) by facilitating renewable energy input into the grid network and by contributing to energy storage capacity in NSW;
- to contribute to the overall storage capacity of the NEM and provide greenhouse gas benefits by increasing the capacity for electricity generated from renewable sources that are intermittent (such as solar and wind) and allowing excess renewable energy capacity to then be injected back into the grid during periods of peak demand where previously gas-fired generation has supported peak demand;
- to deliver improvements to network reliability by providing back-up power during network disruptions;

- to decrease average prices by smoothing out price differences (ie by arbitraging electricity price differences during peak and off-peak periods); and
- to demonstrate the local application of an emerging technology by an operator with extensive global experience in the technology.

The project will create over $545 million initial investment into local and regional economies and further benefits to local businesses and the local community. It will also contribute to the generation of up to 100 jobs during construction, the majority of which are likely to be within the Dubbo LGA.

1.4 The applicant

AMPYR is wholly owned by AGP Sustainable Real Assets, an asset management group that finances, develops and operates sustainable real assets with an aim to drive a net zero greenhouse gas emissions future.

AMPYR's team has over 10 years' experience developing renewable energy projects, mostly large-scale onshore wind and solar but also including battery storage and hydro. AMPYR is presently developing five battery storage facilities internationally with a combined capacity of up to 1190 MW (AMPYR 2022).

The Applicant details are as follows:

- Applicant name: AMPYR Australia Pty Ltd.
- Australian Business Number (ABN): 68 630 312 015.
- Address: 36–38 Young Street, Sydney NSW 2000.
- AMPYR has partnered with Shell to deliver the project.

1.5 Key terminology

For the purposes of this EIS, the following definitions have been adopted and are referred throughout the EIS.

Table 1.1 Key terminology

Terminology	Description
The project	The Wellington Battery Energy Storage System. This refers to all elements that comprise the project for which approval is sought, including associated ancillary infrastructure and connection/augmentation works at the TransGrid Wellington Substation.
The site	The area proposed to be developed as a BESS and subdivided from the remainder of the landholding.
Development boundary	The extent of actual surface disturbance required to facilitate the construction of the project.
Operational boundary	The extent of the site within the development boundary where permanent project infrastructure will be established.
The project area	Comprises the development boundary, incorporating the operational boundary.
Wellington Substation	The 330/132kV substation operated by TransGrid and located at 6909 Goolma Road in Wuuluman (Lot 1 DP 1226751).
BESS compound	The area supporting operational infrastructure associated with the project. The BESS compound will be surrounded by security fencing and accessed from the existing driveway via Goolma Road.
BESS	The portion of the project footprint dedicated to containing battery enclosures and ancillary infrastructure such as the control and office building.

Table 1.1 Key terminology

Terminology	Description
BESS substation	The portion of the project footprint dedicated to the on-site substation. The substation will convert electricity between the high voltage transmission network and medium voltage BESS compound.

1.6 Structure of the report

This EIS consists of a main report and a series of appendices. The main report describes the project in the context of the existing environment, the planning framework, key environmental issues, potential impacts, proposed mitigation measures and residual impacts. It is informed by the technical assessments contained in Appendix E to Appendix O and provides a summary of each technical assessment.

The SEARs are attached in Appendix A, with a reference to where each requirement has been addressed within this EIS. The structure of the EIS is summarised in Table 1.2.

Table 1.2 EIS structure

Chapter	Content
Preliminary	• EIS certification • Executive Summary
Chapter 1: Introduction	Introduces the project and the applicant; provides a brief discussion on the background of the project; discusses the objectives and benefits of the project; and outlines the document structure.
Chapter 2: Strategic context	Describes the strategic justification of the project; provides a brief overview on the regional context of the project and site suitability; and discusses the feasible alternatives to the project.
Chapter 3: Project description	Describes the project including construction and operational parameters, as well as the project location.
Chapter 4: Statutory context	Identifies the relevant State and Commonwealth environment and planning legislation and regulations, the applicable local and regional environmental planning instruments and discusses other approvals and permits that may be applicable to the project.
Chapter 5: Engagement	Describes the engagement strategies for the project, and details how consultation has been addressed in the project's design and assessment.
Chapter 6: Assessment of impacts	Assesses the key environmental issues, identifying the potential impact of the project. A description of the management measures proposed to mitigate and reduce potential adverse environmental risk of the project and /or offset any unavoidable impacts are provided.
Chapter 7: Justification of the project	Summarises the evolution of the project design; strategic justification; statutory compliance; alignment with community views; the project impacts; cumulative impacts; how compliance will be ensured; key uncertainties, proposed mitigation measures; and conclusions.
Abbreviations and References	Contains abbreviations and references used in this EIS.
Appendices:	
Appendix A	SEARs compliance table
Appendix B	Statutory compliance table
Appendix C	Project engagement
Appendix D	Mitigation measures summary table

Table 1.2 EIS structure

Chapter	Content
Technical specialist impact assessment reports:	Supporting information including detailed technical reports
Appendix E	Biodiversity development assessment report (BDAR), EMM 2022a
Appendix F	Aboriginal cultural heritage assessment (ACHA), EMM 2022b
Appendix G	Historic heritage assessment (HHA), EMM 2022c
Appendix H	Land, soil and erosion assessment (LSEA), EMM 2022d
Appendix I	Land use conflict risk assessment (LUCRA), EMM 2022e
Appendix J	Visual impact assessment (VIA), EMM 2022f
Appendix K	Noise and vibration impact assessment (NVIA), EMM 2022g
Appendix L	Traffic impact assessment (TIA), EMM 2022h
Appendix M	Water assessment (WA), EMM 2022i
Appendix N	Hazards and risks assessment (HRA), Sherpa Consulting 2022
Appendix O	Social impact assessment (SIA), EMM 2022j

2 Strategic context

This chapter provides an assessment of the project against the relevant plans and policies, demonstrating the strategic planning context and need for the project.

2.1 Project need

The NEM is a wholesale spot market for selling electricity, and a transmission grid for transporting it to energy customers. Generators make offers to sell power into the market, and the Australian Energy Market Operator (AEMO) schedules the lowest priced generation available to meet demand (AER 2021). The NEM experienced record levels of wind and solar generation in 2020, accounting for over 19% of total electricity generation (AER 2021). This growth is expected to increase into the future, with 26–50 gigawatts (GW) of large-scale wind and solar capacity forecast to come online over the next 20 years (AER 2021).

This transformation from a centralised system of large fossil fuel (coal and gas) generation towards an array of smaller scale, widely dispersed wind and solar generators presents reliability and security challenges to the NEM. In particular, the weather-dependent nature of wind and solar generators makes their output variable and sometimes unpredictable. Accordingly, 'firming' capacity is needed to fill supply during gaps where generation is intermittent (eg lack of wind or sunshine) (AER 2021). A BESS can provide firming capacity by storing excess energy generated during times of low demand and injecting energy back into the grid during periods of peak demand.

Dispatchable energy storage is necessary to offset increases in spot prices arising from the increased penetration of variable renewable energy, which although are the lowest cost form of new generation in the NEM, are intermittent in nature. BESS facilities function to smooth out price differences during peak and off-peak periods and potentially balance out price increases during unanticipated outages thereby putting downward pressure on spot prices.

Additionally, BESS facilities can improve the average emissions intensity of the NEM. It does this by providing more capacity for renewable energy generators, which typically generate energy during times of low demand, and allowing excess renewable energy capacity to then be injected back into the grid during periods of peak demand.

A range of studies and reviews have confirmed the need for energy storage projects. In particular, the *Independent Review into the Future Security of the National Electricity Market 2017* (the Finkel Review) (Dr Alan Finkel et al 2017), commissioned by the Council of Australian Governments (COAG) Energy Council, identifies batteries as playing an important role to support grid reliability when deployed at scale. It further recognises batteries as a critical enabler of emissions reductions.

AEMO publishes an inaugural Integrated System Plan (ISP) which is updated every two years. The draft *2022 Integrated System Plan* (AEMO 2021) (2022 ISP) was released in December 2021 for public comment prior to its publication in June 2022. The 2022 ISP finds that the NEM must triple its overall generation and storage capacity if it is to meet the economy's electricity needs. The 2022 ISP also identifies the need for 45 GW/620 gigawatt-hour (GWh) of dispatchable storage capacity, efficiently operated and firm variable renewable energy into the future. The project will contribute to the storage and dispatchability requirements identified in the 2022 ISP.

Once operational, the project will be one of the largest battery projects in the State, contributing up to 1,000 MWh of storage capacity in the NEM. It will support new and existing renewable energy projects and may also provide various system services and network support. The project will also provide broader security to the grid by providing back-up power during network disruptions.

2.2 Commonwealth policy and objectives

2.2.1 Large scale renewable energy target

The Australian Government Clean Energy Regulator administers the Large-scale Renewable Energy Target (LRET) which incentivises investment in renewable energy projects. The LRET of 33,000 GW hours of additional renewable electricity generation was met at the end of January 2021 (Clean Energy Regulator 2021). The annual target will remain at 33,000 GWh until the scheme ends in 2030 notwithstanding that the Clean Energy Regulator expected that large-scale renewable generation could reach up to 40,000 GWh in 2021.

Consistent with the intent of the LRET, the project will support renewable energy generators through providing firming storage and allow for energy dispatch during periods where intermittent generators are not generating energy.

2.2.2 Integrated System Plan 2022

As described in Section 2.1, the 2022 ISP identifies the need for 45 GW/620 GWh of dispatchable storage capacity, efficiently operated and firm variable renewable energy into the future. The project will contribute to the storage and dispatchability requirements and will therefore support the 2022 ISP.

2.2.3 Australia's Long-Term Emissions Reduction Plan

Australia's Long-Term Emissions Reduction Plan (Australian Government Department of Industry, Science, Energy and Resources 2021) aims at reaching a net zero economy through a technology-based approach, whilst protecting relevant industries, regions and jobs. It is informed by detailed modelling and analysis that confirms the ability for Australia to achieve net zero emissions by 2050. It identifies that storage technologies, like batteries, are critical to enable very high shares of renewables, ensure security and reliability, and acknowledges that energy storage technologies are essential for Australia to shift to lower emissions electricity systems over time.

The project will support the management of daily variations in solar and wind generation and will contribute short-term firming to the grid.

2.3 NSW policy

2.3.1 NSW Electricity Strategy

The NSW Electricity Strategy (DPIE 2019) (the strategy) is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy and sets out an approach to respond to emerging challenges. The strategy recognises that where variable generators are unable to satisfy demand, other technologies that can provide electricity on demand (such as storage) is required. The strategy also identifies four strategic principles of which Principle 1 is relevant to the project which acknowledges renewables, firmed by dispatchable technologies such as storage, are the lowest cost form of reliable electricity generation and calls upon investment into these technologies to reduce electricity prices and ensure network reliability.

The Central-West Orana Renewable Energy Zone is the first of numerous identified REZ's across the State to be coordinated by the Energy Corporation of NSW (EnergyCo NSW) under the strategy. It was formally declared by the NSW Government on 5 November 2021, encompassing the geographical areas around Dubbo and Wellington (Figure 1.1) and is planned to deliver of the order of 3 GW of new network capacity by the mid-2020s.

2.3.2 NSW Electricity Infrastructure Roadmap

The NSW Electricity Infrastructure Roadmap (DPIE 2020a) (the Roadmap) builds on the framework set out by the NSW Electricity Strategy (DPIE 2019) and sets out a rationale for the policies and programs that are specifically designed to attract and secure that large-scale investment in new electricity infrastructure. The Roadmap recognises the findings of the 2022 ISP which finds that by mid-2030, NSW could need up to 2.3 GW of storage with 4 to 12 hours of duration to maintain system reliability and security under most scenarios. The project will contribute to this need for additional energy storage by providing peak capacity of up to 500 MW that can be dispatched as required to meet demand.

2.3.3 Net Zero Plan Stage 1: 2020-2030

The *Net Zero Plan Stage 1: 2020–2030* (DPIE 2020b) sets out how the NSW Government will deliver upon an objective to achieve net zero emissions by 2050 and has an objective to deliver a 50% cut in emissions by 2030 compared to 2005 levels. The project will support renewable energy generators through providing firming storage and allow for energy dispatch during periods where intermittent generators are not generating energy.

2.4 Strategic planning framework

The strategic land use planning documents relevant to the further development of the project are described below.

2.4.1 Central West and Orana Regional Plan 2036

The *Central West and Orana Regional Plan 2036* (Regional Plan) (DPE 2017) provides a blueprint for regional growth balanced with protection of the natural environment. The Regional Plan was developed to provide an overarching framework to guide more detailed NSW government policies for regional land use planning and inform infrastructure funding decisions.

The Regional Plan is made up of four goals, each of which is supported by a series of directions and actions as to how regional and local planning can achieve these goals.

The following goal and associated direction are relevant to the project:

- Goal 1: The most diverse regional economy in NSW.

Renewable energy generation and the need to create a more sustainable energy future for the region is identified as part of this goal. This goal will benefit as a result of the project, which will provide dispatchable storage for renewable energy generation projects and support a shift to a more sustainable energy future.

- Direction 9: Increase renewable energy generation.

This direction is supported by a number of relevant actions. Action 9.2 is relevant to the project:

- Action 9.2: Facilitate small-scale renewable energy projects using bioenergy, solar, wind, small-scale hydro, geothermal or other innovative storage technologies through local environment plans.

2.4.2 Draft Central West and Orana Regional Plan 2041

A 5-year review of the Central West Orana Regional Plan has recently been completed and a draft revision to the plan is on public exhibition at the time of writing. The draft *Central West and Orana Regional Plan 2041* (DPIE 2021e) considers a 20-year timeframe with a focus on the next 5 years. The draft plan builds on the existing regional plan and the 19 local strategic planning statements.

The following objectives of the draft plan are relevant to the project:

- Objective 12: Leverage existing industries and employment areas and support new and innovative economic enterprises – Strategy 12.3: "… encourage diversification of local industries into renewable energy generation, energy sector supply chains and competitive advantages in energy intensive production."
- Objective 20: Leverage the Central–West Orana Renewable Energy Zone to provide economic benefit to communities.

2.4.3 Local strategic planning statement

Adopted in June 2020, the *Dubbo Local Strategic Planning Statement* (Planning Statement) (Dubbo Regional Council 2020) provides a 20-year vision for the future growth within the Dubbo Regional LGA.

The Planning Statement identifies twenty planning priorities for land use planning in the LGA over the next 20 years. A number of these are relevant to this proposal, and these are discussed below.

i Planning Priority 3: Promote renewable energy generation

The planning priority provides acknowledgement that Dubbo is located in a State Renewable Energy Zone as a reflection of the significant investment in renewable energy in the region, however, also acknowledges that such development can result in the temporary sterilisation of agriculture land.

The project is in close proximity to and will support renewable energy generation projects including the Wellington Solar Farm and Unngala Wind Farm. Further, the project is adjacent to the Wellington TransGrid substation and existing transmission infrastructure.

ii Planning Priority 18: Develop resilience to climate change

It is identified in the planning priority that Dubbo is feeling the effects of climate change. It incorporates an action to promote and support investment in renewable energy opportunities.

The project will support renewable energy generation projects by allowing for the storage of non-dispatchable intermittent renewable energy and its subsequent despatch during periods of peak demand.

iii Planning Priority 19: Create an energy, water and waste efficient city

The planning priority recognises that energy use is a key source of CO_2 emissions and identifies a need to reduce reliance on non-renewable energy sources.

The project supports a shift to reduce reliance on non-renewable energy by providing firming capacity for renewable energy sources.

iv Planning Priority 20: Protect and enhance rural lands

The planning priority has an objective to protect and enhance rural lands for agriculture and other forms of primary production including mining, energy generation and forestry.

The project does not compromise the use of any agricultural land. Infrastructure has been designed in consultation with the landowner in consideration of their ongoing use of the remaining portion of the lot for agricultural purposes.

2.4.4 Dubbo Region 2040 Community Strategic Plan

The *Dubbo Regional 2040 Community Strategic Plan* (Strategic Plan) (Dubbo Regional Council 2018) was developed as a requirement of the NSW Government's Integrated Planning and Reporting Framework. It provides the opportunity for local government to engage with communities to determine and plan community aspirations for their regions.

The Strategic Plan identifies five theme areas that are supported by strategies to reach desired outcomes. Of these, the following strategies have been identified as relevant to the project:

i Infrastructure Strategy 2.1: Opportunities for use of renewable energy are increased

This strategy involves Council encouraging and supporting investment into renewable energy opportunities.

As this is the purpose of the project, it will support this strategy.

ii Economy Strategy 3.5: The long term economic growth of the Local Government Area is realised

This strategy involves Council providing opportunities for long term growth and investment across sectors and industry. It also involves Council encouraging new businesses and industry and to grow existing businesses and industry within the LGA.

The project will support sectors and industry within the region as it will contribute to energy security and reliability of the electrical grid and deliver direct financial benefits to local businesses and the local community by smoothing out price volatility.

iii Liveability Strategy 5.9: Environmental sustainability is a priority

This strategy recognises that the community and Council is supported in becoming sustainable.

The project will support this goal to for the region to become more sustainable by providing firming storage for renewable energy.

2.5 Key features of the site and surrounds

As note previously, the project is located in the Dubbo Regional LGA on Goolma Road, approximately 2.2 km north-east of the township of Wellington and 44 km south-east of Dubbo, as shown in Figure 1.1. The locality surrounding the project contains a variety of landscapes within an agricultural setting. Most of the local and sub-regional setting has been cleared for grazing and/or cultivation. There are no major National Parks, nature reserves, conservation areas or State forests close to the project. The closest State Park is Lake Burrendong State Park, approximately 20 km south-east of the site.

Land surrounding the project is relatively flat, apart from a hill approximately 600 m east of the project, which rises about 100 m above the majority of the site. The project is directly south of the Wellington Solar Farm and adjacent and east of the Wellington Substation (see Figure 1.2). The solar panels and related infrastructure of the Wellington Solar Farm and associated grid and transmission infrastructure is a prominent visual feature in the surrounding landscape.

There are a number of other renewable energy generation projects (either approved or proposed) within 5 km of the site including the Uungula Wind Farm and Maryvale Solar Farm (see Figure 1.1) however such projects will not be visible from the site.

The site is within the Macquarie River catchment and Macquarie River is approximately 2 km south-east of the site. There are several first and second order tributaries within the site and across Lot 32 DP 622471. These unnamed watercourses drain to the south-east to the Macquarie River. Other prominent water features include Lake Burrendong approximately 20 km to the south-east of the site (see Figure 1.1).

The land use zoning of the site under the Dubbo Regional Environmental Plan 2012 (Dubbo LEP) is RU1 Primary Production. Land uses zoning surrounding the site include:

- RU1 Primary Production associated with rural residences and cropping and grazing activities;
- SP2 Electricity Generating Works associated with the Wellington Substation north of the site;
- SP2 Correctional Centre associated with the Macquarie Correctional Centre and Wellington Correctional Centre north of the site; and
- R5 Large Lot Residential associated with those residences along Goolma Road, Twelve Mile Road, Cadonia Drive, and Cadia Place.

There are 20 sensitive receptors, being rural properties, within 2 km of the site (refer Figure 1.2). The nearest non-project sensitive receptor is located at 59 Twelve Mile Rd. From proposed project infrastructure, this receiver is setback approximately 800 metres (m) north-east of the site.

Within Lot 32 DP 622471 there is a rural dwelling and farm, setback approximately 500 m from the site. The site is serviced by a network of local and regional roads. This includes Goolma Road and the Mitchell Highway. The site is accessed via Goolma Road which currently provides access to the rural dwelling and internal tracks within the landholding.

The township of Wellington is approximately 2 km to the south-east of the project and includes a range of sensitive uses such as a school, a hospital, recreational areas as well as residential properties. The township of Wellington has no views of the project. When travelling along Goolma Road, views of the project will be limited and screened by roadside vegetation, distant vegetation, and topography.

2.6 Site suitability

The site is suitable for the project for the following reasons:

- close proximity to the Wellington TransGrid Substation – the BESS substation is proposed to be positioned approximately 300 m west of the Wellington TransGrid Substation thereby minimising transmission line distances and allows for the co-location of energy infrastructure;
- compatibility with existing land uses and land use zoning – the project is compatible with surrounding land uses including agricultural land uses and renewable energy projects;
- proximity to major transport links – the project is accessible via Goolma Road and is in close proximity to the Mitchell Highway and township of Wellington; and
- project infrastructure will be positioned to provide a sufficient buffer to non-project related sensitive receivers, such that the nearest private residence is 800 m north-east of the site.

The site is appropriately zoned and complies with and supports the regional and local strategic planning strategies which apply. On the basis of these factors, the site is considered an ideal location for the project.

A land use conflict risk assessment has been undertaken to identify potential conflicts with existing activities or land uses in the local area as detailed in Appendix I. The assessment identified a range of potential conflicts and has recommended numerous management strategies and performance targets for the project, which will be implemented during subsequent phases of the project to avoid and minimise potential conflicts as far as practical.

2.7 Cumulative impacts with other development

Development both within, and in the vicinity of the project, has the potential to generate cumulative impacts with the project. An assessment has been completed with reference to the DPE's *Cumulative Impact Assessment Guidelines* (DPIE 2021a). Cumulative impacts are discussed further in Chapter 6.

2.8 Feasible alternatives to the project

A range of alternatives were considered during development of the concept design are described in this section. Feasible location options for a project of this nature are limited due to the requirement for a close connection point to a suitable substation. Alternatives to the proposed location and site layout were considered by AMPYR as part of the site identification process and in negotiations with the landowner. The following sections describe these alternatives.

2.8.1 Do-nothing scenario

Should this project not proceed the site will continue to be used for copping/grazing. This represents a lost opportunity to:

- provide additional firming capacity to the network and to improve penetration of renewable energy;
- reduce price volatility by storing excess energy during periods of low demand and dispatching energy during periods of peak demand; and
- provide improvements to network reliability and security including providing back-up power during network disruptions.

Due to the need to establish large-scale batteries in NSW, not proceeding with the project in its current location may encourage development of a BESS in a less favourable location, resulting in undesired outcomes and greater impacts to the receiving environment (eg greater requirements for transmission line connection or and costs to consumers).

2.8.2 Siting and layout

A number of different locations within Lot 32 DP 622471 have been considered for the siting of the BESS and ancillary infrastructure as part of the environmental assessment and design process.

In consideration of the local environment and site conditions, the project layout was selected in response to the following:

- it is sufficiently distanced from nearby sensitive receivers thereby reducing noise and air quality impacts – alternate layouts that positioned project infrastructure in the northern portion of the site adjacent to Goolma Road and Twelve Mile Road were considered and subsequently discounted as part of preliminary environmental assessments, during which noise modelling identified that cumulative noise impacts will likely exceed applicable noise limits for sensitive receptors to the north of the site;
- it minimises interactions and impacts on the landowner's residence and ongoing farmland operations;
- it avoids or minimises impacts to the sensitive features of the site, including the unnamed tributaries and remnant woodland and paddock trees;

- it is located on the lot boundary adjacent to the Wellington Substation and existing transmission lines, thereby reducing the length of connecting transmission infrastructure; and
- it is sited at a low elevation that results in few visual impacts due to surrounding vegetation and topography.

Once the preferred site was identified, the general layout of the BESS was determined to provide for an efficient operation that is compatible with the surrounding uses.

The project is proposing to connect into the existing, neighbouring TransGrid switchyard. The required upgrade works on the TransGrid site are subject to detailed design, but may require the connection of overhead or underground conductors and an additional 330 kV switch bay with power transformers, which would be installed as an alternative to the transformer bays being located on the BESS site, and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted. The maximum extent of potential disturbance on the TransGrid site has been considered in the assessment, along with the potential for placement of electrical infrastructure either within the proposed BESS substation or alternatively within the TransGrid site.

A detailed layout of BESS infrastructure will be developed upon contractor selection and detailed design, including required upgrade works and associated infrastructure on the TransGrid site.

3 Project description

3.1 Project overview

The project consists of the construction and operation of a major grid-scale battery project immediately adjacent to the Wellington substation. The project will use lithium-ion battery technology and will have a peak maximum generation capacity of 500 MW/1000 MWh.

A summary of the key aspects of the project is provided in Table 3.1. A more detailed description of the project is provided in this chapter. The works described in these sections are subject to detailed design.

Table 3.1 Key aspects of the project description

Key aspects	Description
Project area	
Address and legal description	6773 Goolma Road, Wuuluman (battery energy storage system and transmission line) described as Lot 32 DP 622471 and 6909 Goolma Rd, Wuuluman (transmission line and Wellington Substation upgrade) described as Lot 1 DP 1226751.
Development boundary	The project will require a disturbance boundary of approximately 19 ha that will be required during project construction (see Figure 3.1).
Operational boundary	The project will have an operational footprint of approximately 13 ha (see Figure 3.1) in which permanent project infrastructure will be located.
Environmental constraints near the project area	The following constraints are present within the site: • nearby sensitive receivers, the closest of which being a resident along Twelve Mile Road (R1) approximately 800 m north-east of the site; • the presence of a tributary to Macquarie River and associated riparian vegetation; • the presence of native vegetation and its associated ecosystem and species values; and • a portion of the site is within a designated bushfire prone area. The project has been designed to avoid these constraints (refer Figure 3.2).
Physical layout and design	
Layout	The proposed BESS will generally comprise the following components: • lithium-ion (Li-ion) batteries inside battery enclosures; • power conversion systems (PCS) incorporating inverters and transformers; • an aboveground or underground transmission line to the Wellington Substation and associated easement; • an on-site substation comprising two 330 kilovolt (kV) transformer bays and ancillary infrastructure; • cabling and collector units; and • an Asset Protection Zone (APZ). The project layout showing these components is presented in Figure 3.1.

Table 3.1 Key aspects of the project description

Key aspects	Description
Mitigation measures	The project has been sited to avoid environmental constraints within or near the site while minimising distances to the TransGrid Wellington Substation. Key mitigation measures considered in the project design include: • avoidance of higher condition native grassland and woodland in project siting and selection of disturbance area (refer Section 6.1); • suitable APZs incorporated in design of proposed infrastructure and disturbance area; • construction of noise attenuation/acoustic barriers (wall/retaining wall and batter or earth mounds) four metres in height to the north, east, south and west as a means of reducing potential noise impacts on nearby residential receivers (refer Section 6.3); and • planted landscaping around project infrastructure to minimise visual impacts (refer Section 6.9);
Ancillary infrastructure and upgrades	The project will include the following ancillary components and upgrades: • an upgrade to the existing site access (currently at the intersection of Goolma Road and Twelve Mile Road) to facilitate safer connection to roadway network and to facilitate the entry of larger construction vehicles, and removal of an existing tree on the opposite side of Goolma Road to improve sight distance at the intersection; • upgrades to existing access tracks within the project boundary; • connection to the switchyard in adjoining TransGrid Wellington substation; • upgrade of the TransGrid Wellington Substation, which may include an additional 330 kV switch bay with power transformers (which may be installed as an alternative to the transformer bays being located on the BESS site), switchyard bench extension to the south of the existing bench and relocation of security fencing; • control and office building and associated parking; • drainage and stormwater management; • ancillary infrastructure including security fencing, lighting and closed-circuit television; and • connection to utilities (telecom, sewerage, etc).
Built design, materials and finishes	Project enclosure components and cabinets will be light in colour to assist with heat management and made of steel. The control and office building will be a prefabricated building comprising a lunch room, office and ablutions room. The building will be assembled onsite and built to a height of 5 m tall. The building will be made of Trimclad steel or similar and grey in colour. Upgrade of the Wellington substation will comprise an extension to the existing infrastructure elements on that site.
Design elements subject to change during detailed design	Detailed design for the project has yet to be completed. The following design elements may be amended throughout the detailed design process: • the layout of the BESS units and substation infrastructure; • the transmission line alignment and arrangement (ie either above ground on steel lattice tension structures and poles or underground); • the control and office building (material, finishes); • works at the TransGrid Wellington substation and switchyard to accommodate project connection; and • the location of attenuation features (noise wall/bunds) and fencing.
Plans and figures illustrating the layout and design in plan-view and cross section	An overview of the project layout is provided in Figure 3.1.
Specifications	
Discharge capacity	Up to 500 MW.
Storage capacity	Up to 1,000 MWh or two hours of maximum discharge capacity.

Table 3.1 Key aspects of the project description

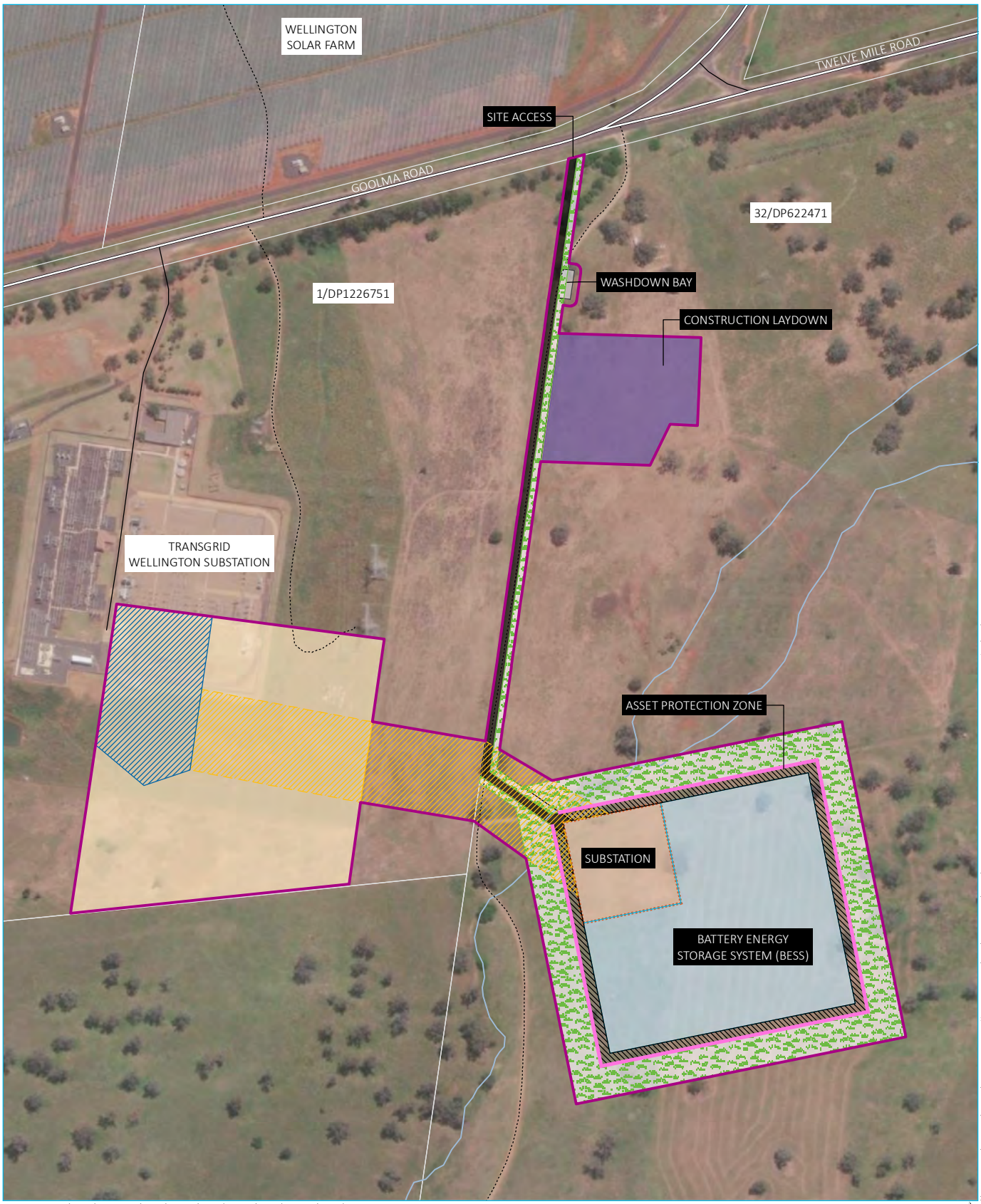
Key aspects	Description
Typical operating cycle	One to two cycles per day on average assumed for assessment.
BESS compound components	Specific component requirements are subject to selection of the potential technology provider. The BESS compound will comprise: • 1,400–6,200 pre-assembled battery enclosures incorporating power conversion systems, thermal management systems, and safety systems; • 150–300 inverters/transformers; and • ancillary infrastructure (eg electrical switchroom, a control and office building, security fencing). Battery enclosures will be approximately 3 m tall.
BESS substation components	An on-site substation will comprise: • two 330 kV transformer switch bays; and • 33kV indoor switchgear housed in portable substation containers. The tallest component of the substation will be the tips of bushings, approximately 11 m tall, however the bulk of the unit will be 9 m tall.
Connection infrastructure	An approximate 500 m 330 kV transmission line will extend from the BESS substation. TransGrid has advised that the Wellington Substation upgrade works may incorporate installation of one new 330 kV switch bay and multiple transformers, which may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.
Construction	
Capital investment value	$545 million AUD.
Construction activities	Construction of the project will involve: • civil and enabling works; • structural, mechanical and electrical works; • commissioning; and • demobilisation. The project is anticipated to take approximately 12–18 months to construct. Construction of the project will require an area of approximately 12 ha to facilitate the movement of plant and equipment (disturbance footprint). This area is illustrated in Figure 3.1. This area will incorporate a temporary laydown area near the site access for the storage of materials and infrastructure prior to installation at the site.
TransGrid connection works	The project will connect to the Wellington Substation switchyard either via overhead or underground cables extending from the on-site substation. TransGrid has advised that the Wellington Substation upgrade works may incorporate installation of one new 330 kV switch bay and multiple transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.
Construction workforce	The project will create up to approximately 100 construction employment opportunities, many of which are expected to be sourced from the Dubbo region and other surrounding regional areas.

Table 3.1 Key aspects of the project description

Key aspects	Description
Construction scheduling and staging	Construction of the project will be undertaken over a minimum of 8 months and up to a maximum of 12–18 months under normal circumstances. Construction of the project may be undertaken as a single stage, or over two stages. For the staged construction scenario, Stage 1 would likely include 300 MW installed discharge capacity, all civil and enabling works, installation of batteries, one transformer and switchgear and associated structural, mechanical and electrical works, and connection to the substation. Stage 2 would consist of 200 MW, including installation of a second transformer and associated switchgear and batteries. It is anticipated that construction of Stage 2 would commence approximately 6–12 months following completion of Stage 1 works.
Construction hours	Construction of the project will be undertaken in accordance with the recommended standard/normal hours as defined by the *Interim Construction Noise Guideline* (DECC 2009) and *Draft Construction Noise Guideline* (EPA 2020) being: • Monday to Friday: 7.00 am to 6.00 pm; • Saturday: 8.00 am to 1.00 pm; and • no works of Sunday and public holidays. Some exceptions may be made for low impact works and extraordinary circumstances.
Vehicle movements	The following maximum vehicle movements are predicted (subject to detailed design): • an average of up to 100 passenger vehicles per day (100 in and 100 out) during the construction works phase; • an average of up to 60 heavy vehicles per day (60 in and 60 out) during the construction works phase; and • up to 20 oversize overmass (OSOM) vehicles during the construction works phase. Average daily heavy vehicle movements during the construction phase will generally be significantly lower than outlined above as the delivery of enclosures is anticipated to occur in batches.
Transport	Project components (batteries, enclosures, PCS components and substation components) will be transported to the site from Sydney/Newcastle via the Mitchell Highway and Goolma Road, an approved B-double route. Construction materials sourced from surrounding concrete batching plants and hard rock quarries. Construction labour, equipment and plant will likely be sourced from Dubbo and other surrounding regional centres.
Water demand	Water used directly on site for construction is estimated at 10 mega litres (ML) used predominantly for dust suppression purposes. Water sources will be confirmed during detailed design but are likely to include a combination to be sourced from bore water located on the participating landholder's land, municipal water supply (in agreement with the relevant authority) and/or imported water in portable tanks.
Operation	
Operational activities	Operation of the project will involve: • maintenance and cleaning of equipment; • general office activities; and • waste removal.
Operational employment	The project will contribute to the employment of up to two employees during operation.
Operational life expectancy	The BESS is expected to operate for 20 years. At the end of operational life, this may be extended subject to the replacement of components.
Operational hours	The BESS will operate 24 hours a day, 7 days a week and be operated remotely.

Table 3.1 Key aspects of the project description

Key aspects	Description
Vehicle movements	Up to 4 trips per day (4 in-bound and 4 out-bound), compromising: • staff vehicles up to 3 per day (3 in-bound and 3 out-bound); and • heavy vehicles up to 1 per day transporting replacement parts and equipment as required. Vehicle movements to and from the site will occur infrequently during operations, primarily for scheduled maintenance.
Decommissioning	
Decommissioning timing	At the end of the operational life of the BESS the project will either be replaced and upgraded or built infrastructure will be removed and the site rehabilitated.
Decommissioning works	Works undertaken during decommissioning will not exceed intensity associated with construction works and is expected to take up to 8 months.



Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017); ICSM (2014)

0 100 200 m

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KEY

- Development boundary

Project components

- Indicative asset protection zone (10 m)
- Indicative transmission connection corridor
- Indicative TransGrid substation upgrade core infrastructure area
- Indicative TransGrid substation upgrade disturbance area
- Battery Energy Storage System (BESS) (battery rows offset at 6 m spacing and setback from substation)
- Substation
- Washdown bay
- Construction laydown
- Indicative landscaping (post construction)
- Access road
- Indicative location of noise bund

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary

Project overview

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 3.1

EMM creating opportunities

3.1.1 Concept design

The project is subject to detailed design. Aspects of the project (including the siting of project elements and construction methodology) are subject to change during detailed design process but will otherwise not lie beyond the disturbance boundary identified on Figure 3.1. This EIS is based on consideration of reasonable worse case environmental impacts to allow flexibility in design and construction methodology.

3.1.2 Project area and location

The project will be developed within privately owned Lot 32 DP 622471 and will incorporate either an overhead or underground transmission line and upgrade works to the Wellington substation in the adjoining TransGrid owned landholding (Lot 1 DP 1226751). The Wellington Substation is located approximately 300 m west of the proposed location of the BESS substation.

Lot 32 DP 622471 is proposed to be subdivided from the remainder of the landholding which will continue to use for grazing and agricultural purposes.

3.1.3 Physical disturbance

Permanent project infrastructure will occupy an area of approximately 13 ha. During construction, the project will require a disturbance area of approximately 19 ha.

Vegetation clearing, cut and fill and bulk earthworks will be required to establish desired design levels to facilitate project infrastructure. Gravel cover will be established to allow for a managed surface that is partially permeable. Project infrastructure and equipment will either be established on concrete pads or mounted on skids affixed to the concrete pads. Depending on further detailed design, piled foundations may be required in certain areas to accommodate project infrastructure. The existing access track will be improved (road base) realigned and extended to the project infrastructure area.

Limited ground disturbance may also be required to facilitate a temporary construction compound/laydown area and washdown area at the site entrance. The siting of this area will be clear of established trees and located mostly within previously disturbed areas.

The maximum extent for potential ground disturbance on the TransGrid site has been considered to allow for flexibility in alignment of connecting infrastructure (poles and wires) from the BESS site, however the anticipated footprint for disturbance associated with core infrastructure (transformers, gantry and associated ancillary infrastructure) would be limited to an extension to the south of the existing bench (refer Figure 3.1).

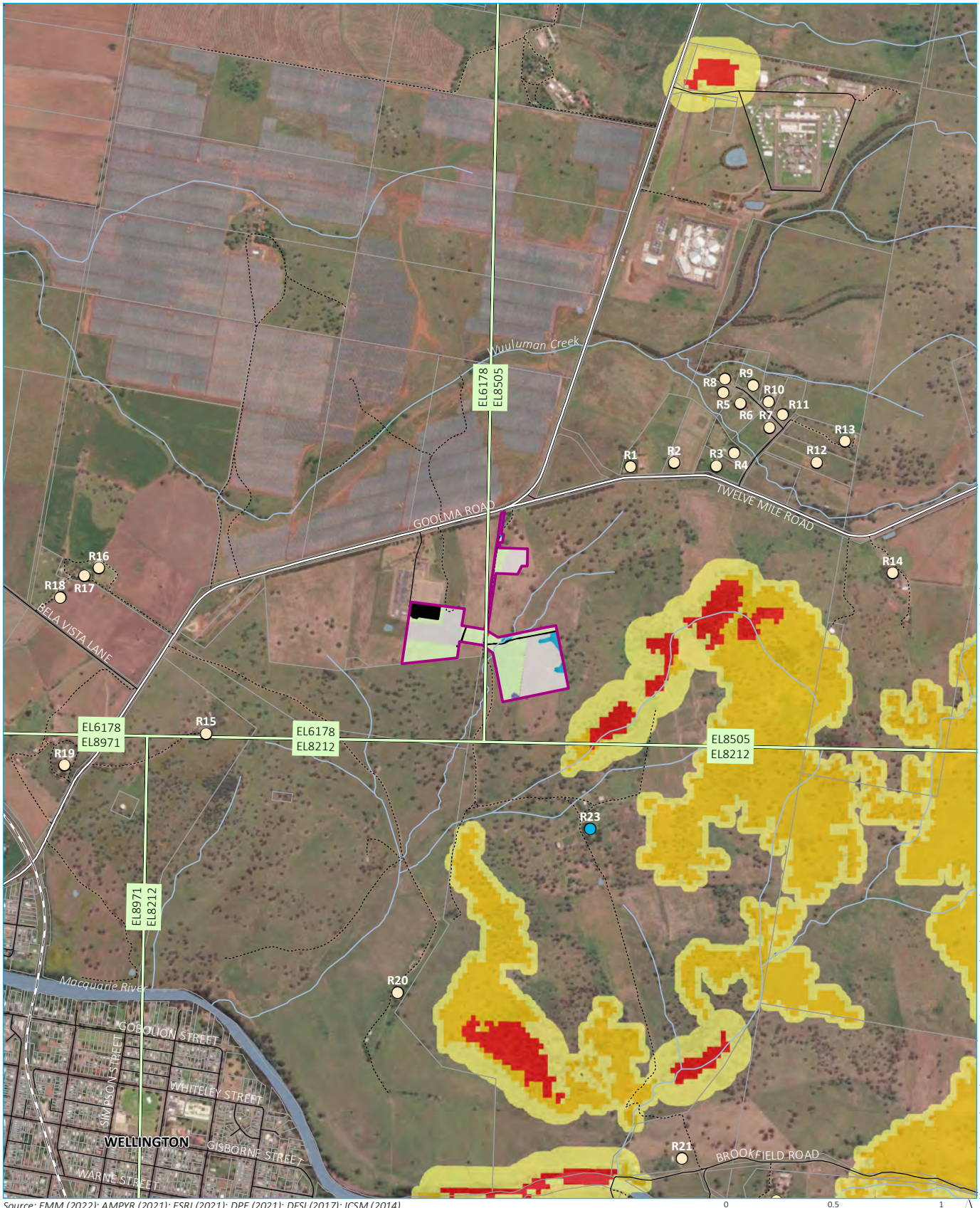
Areas disturbed during construction and not required for the operation of the project will be rehabilitated following completion of construction. An asset protection zone will be established and maintained on an ongoing basis for bushfire protection purposes.

3.1.4 Environmental constraints

The project area has been sited to avoid the environmental constraints of the site or minimise impacts to these aspects. These constraints include:

- the presence of native vegetation, predominantly Plant Community Type (PCT) 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion in varying condition, and avoidance of higher condition patches of vegetation;
- nearby residential receivers with potential to experience significant noise impacts;
- the project's resilience to bushfire and requirement for suitable APZs around proposed infrastructure; and
- an ephemeral, second-order watercourse. Project elements (batteries, PCSs and substations) have been sited at distance to minimise works in the vicinity of the riparian zone and a crossing will be developed over the watercourse.

The project site is also subject to two exploration licences (refer Figure 3.2): EL8505 - which extends across the project site and is held by Endeavor Minerals; and EL6178 – extends over the TransGrid site and is held by Modeling Resources Pty Ltd. Consultation with these stakeholders has been undertaken as part of preparation of the EIS as summarised in Section 5.5.



Source: EMM (2022); AMPYR (2021); ESRI (2021); DPE (2021); DFSI (2017); ICSM (2014)

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Cadastral boundary
- Mining/exploration lease boundary

Receivers

- Non-project residential receivers
- Project participating landowner

- Not vegetated

Plant community type

PCT 266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (Box Gum Woodland CEEC (BC Act))

- Moderate (intact)
- Low (intact)
- Poor (intact)
- DNG (moderate)

Bushfire prone land category

- Vegetation category 1
- Vegetation category 2
- Vegetation buffer

Environmental constraints

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 3.2

EMM creating opportunities

3.2 Physical layout and design

3.2.1 The BESS compound

The project team has engaged with the supply chain and conducted a preliminary tender process with technology suppliers and has undertaken a formal technology review initially focused on inverter capabilities. Concept designs from numerous suppliers have been relied upon to develop this project description and in some cases ranges have been provided to allow for different equipment options currently under consideration. Detailed design of the project will be conducted following contractor selection to allow sufficient flexibility in the selection of technology. This approach will allow the project to maximise potential benefits from the rapid technology advancements currently underway in the BESS industry. Key design features of the BESS are provided in Table 3.2.

Table 3.2 Key project features

Feature	Parameter
Power output	500 MW
Energy storage capacity	1,000 MWh
Transmission voltage	330 kV
Charge and discharge cycle	365 days per year and 1–2 cycles per day
Design life	20 years (subject to component replacement and life extension)

The BESS compound is proposed to be developed within a footprint immediately south-east of the Wellington Substation and shown in Figure 3.1.

The project will comprise up to 1,400 to 6,200 battery enclosures. The exact number of enclosures required will be subject to the technology provider selected. The largest enclosure type will be 2.5 x 2.5 x 3 m (length x width x height).

Battery enclosures will be arranged in rows and comprise:

- racks of lithium-ion type batteries;
- a battery management system to protect cells from harmful excesses of voltage, temperature, and current;
- an energy management system that is responsible for system power flow control; and
- a thermal management system that controls all functions related to the heating, ventilation, and air-conditioning of the enclosure system.

Battery enclosures will be integrated with a power conversion system (PCS). A PCS will contain equipment such as inverters and transformers and will function to convert the power flow between battery and grid. The PCS will also house the required control and monitoring components such as voltage sensing units and thermal management of power electronics components.

The BESS compound will be supported by ancillary infrastructure, including:

- electrical switchrooms;
- a control and office building and associated parking for operational staff and visitors;
- connection to utilities (telecom, sewerage, etc);

- drainage and stormwater management;
- lighting;
- closed-circuit television cameras (CCTV); and
- security fencing.

A single-storey control and office building will be established during construction and kept for the duration of operation to allow for remote operation and facility management.

Battery units will be up to 3 m in height and arranged in rows across the BESS compound area. Batteries will be arranged in groups and mounted on concrete footings or potentially compacted gravel.

The compound will be surrounded by security fencing and accessed from the existing driveway via Goolma Road.

3.2.2 BESS substation

A substation will be established within the site to convert electricity between the high voltage transmission network and medium voltage BESS compound. The substation will be within an indicative footprint of approximately 100 m x 100 m and established on a concrete pad. The substation will be separated from BESS compound infrastructure by security fencing and an asset protection zone. The BESS substation will comprise up to two 330 kilovolt (kV) transformer bays. Transformer bays will be bunded and subject to separation distances in accordance with manufacturer requirements. The BESS substation will also include:

- an auxiliary services building to accommodate secondary protection systems, AC/DC distribution equipment, fire detection systems, a supervisory control and data acquisition (SCADA) system, system dispatch control, CCTV, and intrusion detection;
- 33/0.440 kV auxiliary transformers;
- high voltage connections between switchgear; and
- other ancillary components including security fencing, lightning protection, lighting poles, security poles and cabling.

The BESS substation will connect to BESS infrastructure by way of underground 33 kV cables.

3.2.3 Network connection

The project will connect to the adjoining Wellington Substation by way of a 330 kV overground or underground cable. The following infrastructure is required to connect the battery to the grid:

- medium voltage electrical reticulation to allow the delivery of electricity from the point of connection;
- 33/330kV transformer(s);
- an overhead or underground tie-in to the Wellington Substation; and
- protective equipment and connection infrastructure at the switchyard within the Wellington Substation.

The transmission line will extend approximately 500 m from the BESS substation and if overhead, will be strung on two 330 kV double circuit steel lattice tension structures with 330 kV steel pole terminal structures. The transmission line will require the establishment of an easement up to 60 m wide.

i TransGrid switchyard works

The project is proposing to connect into the existing, neighbouring TransGrid switchyard. The required upgrade works on the TransGrid site are subject to detailed design, but are expected to require the connection of overhead or underground conductors and an additional 330 kV switch bay and may include power transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted. The work will include:

- switchyard bench extension to the south of the existing bench;
- relocation of security fencing;
- may include construction of new 330 kV gantry columns and beams, three phase busbar supports, single phase busbar supports, three phase disconnectors, three phase circuit breaker, single phase current transformers, single phase voltage transformers, single phase surge arresters; and
- overhead or underground cables as required for the new 330 kV switch bay.

3.2.4 Control and office building

A control and office building will be established within the BESS compound. The building will be established during construction and maintained throughout the project's operational life. The control and office building will be a prefabricated building comprising a lunch room, office and ablutions room and involve the following equipment:

- a power plant controller which will be used to dispatch the BESS in accordance with instructions received from the SCADA system;
- a remote terminal unit which will marshal all digital and analogue signals originating within the BESS equipment for communication via the SCADA system;
- high resolution power monitoring equipment which will monitor the output voltages, currents, power and reactive power of the BESS;
- AC and DC auxiliary power distribution boards;
- 330/33 kV transformer protection systems;
- 330 kV protection necessary for the 330 kV cabling, overheads, switchgear and busbars;
- 33 kV protection of the cabling between the 330/33 kV transformers and the 33kV switchgear substation buildings;
- ventilation and air conditioning systems; and
- fire detection and fire suppressant systems.

The building will be assembled onsite and built to a height of 5 m tall. The building will be built of Trimclad steel or similar and grey in colour.

3.2.5 Utilities and services

Power and telecoms will be established as part of the construction of the transmission line system. Auxiliary power shall be sourced from 33/0.440 kV station auxiliary transformers. The main AC distribution board shall be housed in the control and office building. Each of the 33 kV switchgear rooms will house their associated AC distribution boards.

Protection and control systems will be supplied by duplicate DC auxiliary supplies and associated station batteries. The main DC distribution boards will be housed in the control and office building and each of the 33 kV switchgear rooms will house their associated DC distribution boards.

Water source(s) will be confirmed during detailed design but may involve municipal water supply, local bore water supply and/or imported water.

Sewerage will be managed via a septic tank system and involve routine pump out.

3.2.6 Access and internal road network

Access to the site is currently provided via Twelve Mile Road at the intersection with Goolma Road.

As part of the conditions of consent for the Uungula Wind Farm (SSD 6687), the proponent (CWP Renewables) is committed to undertake the following road upgrades in support of the use of Goolma Road and Twelve Mile Road for the transport of plant and equipment during construction of that project:

- the closure of the existing intersection at Goolma Road and Twelve Mile Road;
- the construction of a new intersection 400 m to the north and realignment of Twelve Mile Road to connect to the new intersection; and
- upgrades to Twelve Mile Road along the transport route.

Site access requirements for this project have been considered based on the assumption that the committed road/intersection upgrade works associated with Uungula Wind Farm will be completed prior to commencement of construction for this project, which is based on current understanding of construction scheduling for Uungula Wind Farm at the time of writing.

In order to provide for the safe access of trucks and Oversize Overmass (OSOM) vehicles, it is proposed to establish a new access to Goolma Road near the boundary to the adjoining landholding (Lot 1 DP1226751). The internal gravelled road, which presently provides access to the landowner's residence will be realigned and improved to facilitate the access and egress of larger vehicles during construction. Improvements include gravel coverage, widening to 8 m and additional drainage as required. The road will be maintained during operation to allow for the access and egress of maintenance and operational vehicles to batteries and the control and office building.

The existing access and driveway will be closed, and an alternative and separate access will be established to access the landowner's residence prior to construction of the project. This will likely be positioned to the east along Twelve Mile Road.

The project proposes an auxiliary short left turn bay (AUL(S)) and a channelised right turn bay (CHR) on Goolma Road at the site access intersection. Further detail is provided in the Section 6.8.

3.2.7 Lighting

Lighting will be provided via pole mounted installations across the BESS compound. Lighting will only be powered to carry out emergency and routine maintenance operations at night. Building and battery enclosures will also be fitted with internal lighting which will include emergency lighting rated for no less than two hours in the event of a power outage.

3.2.8 Built design, materials and finishes

Battery enclosures will likely resemble shipping containers and may require white finishes for thermal regulations and longevity purposes. As committed in Section 6.9, where possible, suitable colours and finishes will be chosen for project infrastructure to minimise visual impacts, including glare/reflectivity), including the O&M buildings/facilities and the acoustic wall surrounding the BESS area.

3.2.9 Design elements subject to change during detailed design

Flexibility is required in the siting of certain components of the project (in particular batteries and cabling) in order to:

- minimise the need for cut and fill;
- avoid sensitive areas of biodiversity; and
- accommodate changes in technologies and/or plant depending on availability.

Design processes are ongoing and will continue concurrently with the EIS exhibition and subsequent phases of the assessment.

3.3 Construction

3.3.1 Construction activities

Key construction activities that will be undertaken as a part of the proposed BESS will comprise:

- installation and maintenance of environmental controls including drainage and sediment controls;
- mobilisation and establishment of temporary construction facilities and temporary laydown area;
- improvements to existing access and internal track;
- vegetation clearing to accommodate BESS compound infrastructure, the transmission line easement and asset protections zones;
- cut, fill, and compaction activities to desired design levels;
- installation of drainage including a consideration of diverting the tributary waterway beneath a section of the project access way;
- construction of concrete pads to support batteries, PCSs, and substation;
- delivery and installation of battery modules and enclosures, power conversion systems, cabling, and transformers;
- installation of tower structures including foundation piles;

- installation of overhead or underground cabling from the BESS substation to the TransGrid substation switchyard;
- relocation of existing security fencing around the TransGrid substation switchyard;
- switchyard bench extensions to the south of the existing bench of the TransGrid substation switchyard;
- construction of new 330 kV gantry columns and beams, three phase busbar supports, single phase busbar supports, three phase disconnectors, three phase circuit breaker, single phase current transformers, single phase voltage transformers, single phase surge arresters;
- installation of overhead cables as required for the new 330 kV switch bay;
- landscaping;
- testing and commissioning; and
- removal of construction equipment and rehabilitation of disturbance areas.

3.3.2 Construction program

Construction is expected to commence in May 2023 (subject to approval). The project will be constructed and commissioned in line with battery supply availability, labour and equipment availability and increasing demand in the network. This may occur in a single stage over a period of 12–18 months. Alternatively, it is considered likely that it may occur over two stages as follows:

- Stage 1 – commencement of construction May 2023 and operations May 2024; and
- Stage 2 – commencement of construction November 2024 and operation November 2025.

Construction of the project, or each stage of it, would be undertaken in four phases, as follows:

- enabling works (ie site establishment) – approximately 2–4 months;
- construction works (civil works, structural works, and electrical works) – approximately 5–8 months;
- commissioning – approximately 4–5 months; and
- demobilisation – approximately 1 month.

For the staged construction scenario, Stage 1 would likely include 300 MW installed discharge capacity, all civil and enabling works, including construction of the site intersection and access road works, installation of batteries, one transformer and switchgear and associated structural, mechanical and electrical works, and connection to the substation. Stage 2 would consist of 200 MW, including installation of a second transformer and associated switchgear and batteries.

TransGrid has advised that the Wellington Substation upgrade works may incorporate installation of one new 330 kV switch bay and multiple transformers (which would be installed as an alternative to the transformer bays being located on the BESS site), and may be installed in stages to coincide with the staged construction of the BESS should a staged approach be adopted.

3.3.3 Construction hours

Construction hours for the project will be consistent with the *Interim Construction Noise Guideline* (DECC 2009) recommended standard construction hours for normal construction and the and *Draft Construction Noise Guideline* (EPA 2021) being, namely:

- Monday to Friday: 7.00 am to 6.00 pm;
- Saturday: 8.00 am to 1.00 pm; and
- no works of Sunday and public holidays.

Certain activities may be required outside of the standard construction hours. These activities potentially include:

- delivery of plant and equipment for safety reasons (eg oversize overmass vehicles);
- commissioning and testing activities that must align with demands on the grid; and
- situations where agreement is reached with nearby affected receivers and local council.

3.3.4 Construction workforce

The construction phase of the project is expected to require up to 100 construction personnel, the majority of which are expected to be generated in the Dubbo/Wellington region. Preference will be made for contractors utilising a regional workforce.

3.3.5 Plant and equipment

The typical plant and equipment required for construction will include items listed in Table 3.3.

The majority of the plant and equipment will be delivered to site on rigid and semi-trailer low-loaders. Construction materials will be delivered on rigid concrete agitators, truck and dog, and semi-trailer dump trucks.

Table 3.3 Typical construction plant and equipment

Construction phase	Plant type
Enabling works	• Front end loaders • Dump trucks • Road trucks • Water trucks • Excavators (35 t) • Graders • Compactors and rollers • Light vehicles • Scissor lifts • Franna cranes

Table 3.3 Typical construction plant and equipment

Construction phase	Plant type
Construction and commissioning works	• Front end loaders • Dump trucks • Road trucks • Water trucks • Concrete trucks and pumps • Excavators • Graders • Compactors and rollers • Scrapers • Backhoe • Concrete saws and grinders • Light vehicles • Scissor lifts • Franna cranes • Mobile cranes • Generators • Welding equipment • Compressors • Air track drill
Commissioning	-
Demobilisation	• Road trucks • Water trucks • Concrete saws and grinders • Excavators • Franna cranes • Backhoes • Compactors and rollers

3.3.6 Construction materials

Construction materials will be sourced locally where practicable. The following indicative volumes of materials are likely to be required for the construction of the project:

- approximately 220 tonnes (t) of structural steel;
- approximately 5,000 cubic metres (m^3) of concrete;
- cabling (quantity and mass subject to detailed design);
- prefabricated enclosures and buildings; and
- sand (for cable bedding), gravel, and bitumen (quantities subject to detailed design).

Approximately 10 ML of water will be required during construction and sourced either from bore water located on the participating landholder's land, municipal water supply (in agreement with the relevant authority) and/or imported water in portable tanks.

3.3.7 Construction traffic

The following construction vehicle movements are anticipated:

- an average of up to 100 passenger vehicles per day (100 in and 100 out) during the construction works phase;
- an average of up to 60 heavy vehicles per day (60 in and 60 out) during the construction works phase; and
- up to 20 oversize overmass (OSOM) vehicles (in total) during the construction works phase.

Passenger vehicles are expected to arrive at the site prior to commencement of construction shifts. Construction vehicles are anticipated to be primarily via regional centres to the west of the site including Dubbo/Wellington (60%) and or north/east of the site including Dunedoo/Gulgong/Mudgee (40%) and are anticipated to travel to the site via the Mitchell Highway and Goolma Road (west) and Goolma Road (north/east), respectively.

Heavy vehicle movements, particularly those associated with the delivery of materials and equipment will generally be evenly spread throughout construction hours. Most heavy vehicles are anticipated to be via Sydney/Newcastle and surrounding regional centres (60%). Some heavy vehicles will also originate from Dubbo, Orange, and Parkes (40%). Vehicles travelling from Sydney and Newcastle are anticipated to travel to site via the Castlereagh Highway and Goolma Road (east), an approved B-double route. Other vehicles are anticipated to access the site via the Mitchell Highway and Goolma Road (west).

OSOM vehicle movements will occur outside of standard construction hours, are anticipated to be wholly via Sydney/Newcastle and are anticipated to travel to site via the Castlereagh Highway and Goolma Road (east) route.

3.4 Operations

The BESS will operate 24 hours a day, 7 days a week and be operated remotely. The BESS is expected to undergo one to two full cycles of charging and discharging per day. Regular maintenance activities will be required throughout the project's operational life. This maintenance may potentially include the replacement of BESS components. Light vehicles will access the site throughout the operations phase for maintenance activities. Heavy vehicles may also occasionally access the site to replace larger components as necessary.

Over the operational life of the project components may be upgraded. These works, if required, will not be intensive (ie it would not involve additional units) and are likely to be significantly lower than the construction works assessed in this EIS. Said upgrade works may also provide additional generation capacity without increasing the disturbance area/impacts associated with the project.

The operation of the project is expected to commence from 2024 for a period of approximately 20 years. Once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and removed from the site.

The project will contribute to the employment of up to two employees during operation.

3.5 Decommissioning

At the end of the economic life, AMPYR will evaluate the future use of the site (either to replace or to decommission the project).

Project decommissioning will involve returning the project area as close to practicably possible to its pre-existing land use.

3.6 Environmental management

An environmental management strategy (EMS) will be implemented to provide the strategic framework for environmental management of the project and will:

- incorporate a project environmental management plan (EMP), all other required plans, protocols, management and mitigation measures proposed in this EIS;
- identify all relevant statutory approvals;
- establish roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
- establish procedures for consulting with the local community and relevant agencies about the operation and environmental performance of the development; and
- establish procedures for handling of complaints, disputes, non-compliances and emergency response.

Chapter 6 provides a consolidated summary of the management measures that will be implemented during the construction and operation of the project to manage, mitigate and/or monitor potential impacts identified within this EIS.

4 Statutory context

This chapter identifies the key relevant statutory requirements for the project having regard to the EP&A Act and EP&A Regulation, other NSW and Commonwealth legislation, and environmental planning instruments.

This section has been set out in accordance with the *State significant development guidelines – preparing an environmental impact statement* (DPIE 2021a), to cover the following:

- power to grant approval (ie approval pathway);
- permissibility;
- other approvals;
- pre-conditions to exercising the power to grant approval; and
- mandatory matters for consideration.

Detailed consideration of relevant statutory requirements is given in the assessment sections of the EIS.

This section identifies the statutory requirements that are relevant to the assessment and evaluation of the project. All statutory requirements, including administrative requirements, are addressed in Appendix B.

The SEARs require the EIS to address legislative and policy requirements, which are listed in Appendix A.

4.1 Approval pathway for the project

The EP&A Act defines the statutory framework for planning approval and environmental assessment in NSW. The EP&A Act is administered by the Minister for Planning and Public Spaces, statutory authorities, and local councils. Approval is sought under Part 4, Division 4.7 of the EP&A Act which relates specifically to SSD. Under Section 4.36 of the EP&A Act, a development is State significant if it is declared to be SSD by any SEPP.

The relevant SEPP is the which declares the development proposed by the project to be SSD is the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). In particular, Section 2.6(1) of the Planning Systems SEPP states:

> (1) Development is declared to be State significant development for the purposes of the Act if-
>
> (a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
>
> (b) the development is specified in Schedule 1 or 2.

The project is not permissible without development consent under Part 4 of the EP&A Act.

The project is a type of development specified in Schedule 1 of the Planning System SEPP, as it meets the definition of 'Electricity generating works and heat or co-generation' (Section 20).

Section 20 defines development for the purposes of electricity generating works and heat or co-generation, as:

> 20 Electricity generating works and heat or co-generation
>
> Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that—
>
> (a) has a capital investment value of more than $30 million…

The project has a capital investment value greater than $30 million. Therefore, the project is SSD and approval is sought under Part 4, Division 4.7 of the EP&A Act. The consent authority for SSD is either the Minister for Planning and Public Spaces or the Independent Planning Commission.

An application for SSD project must be accompanied by an EIS prepared in accordance with the EP&A Regulation and the Secretary's Environmental Assessment Requirements (SEARs) for the project.

4.2 Permissibility

Section 2.6(1)(a) of the Planning Systems SEPP requires that for a project to be designated SSD it must be development that is not permissible without consent under Part 4 of the EP&A Act, by virtue of an environmental planning instrument. This introduces the permissibility test which is addressed in this section. The relevant environmental planning instrument is the *Dubbo Regional Local Environmental Plan 2022* (Dubbo LEP).

The project is located on land zoned RU1 Primary Production and SP2 Infrastructure under the Dubbo LEP as shown in Figure 1.3.

The objectives of the RU1 zone are as follows:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- to encourage diversity in primary industry enterprises and systems appropriate for the area;
- to minimise the fragmentation and alienation of resource lands;
- to minimise conflict between land uses within this zone and land uses within adjoining zones; and
- to provide for a range of tourism-related uses that support the agricultural industry or are compatible with agricultural uses.

The objectives of the SP2 zone include:

- to provide for infrastructure and related use; and
- to prevent development that is not compatible with or that may detract from the provision of infrastructure.

The project is best characterised as 'electricity generating works' which is defined under the Dubbo LEP as:

> electricity generating works means a building or place used for the purpose of—
>
> (a) making or generating electricity, or
>
> (b) electricity storage.

Electricity generating works, and works that are ordinarily incidental or ancillary to purposes shown on the Dubbo LEP Land Zoning Map (ie the Transgrid substation which the project will connect to) are permitted with consent under the land zoned SP2. Under RU1, development for the purpose of electricity generating works is a prohibited land-use. Notwithstanding this prohibition the project is a permissible land-use with development consent by virtue of Section 2.36(1) of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) which permits electricity generating works on any land in the RU1 and SP2 zones.

Therefore, the project is wholly permissible with development consent.

The project also involves a rural subdivision. The Dubbo LEP Lot Size Map has a minimum lot size of 400 ha. Section 4.2(3) of the Dubbo LEP provides that land in an RU1 zone may, with development consent, be subdivided for the purpose of primary production to create a lot of a size that is less than the minimum size shown on the Lot Size Map in relation to the land.

AMPYR intends to enter into a voluntary planning agreement (VPA) with Dubbo Regional Council for the proposed project. Consultation with Dubbo Regional Council regarding the details of the VPA is ongoing and will be finalised as part of subsequent phases of the planning approval process.

4.3 Other approvals

This section identifies the other approvals that are required to carry out the project and explains why they are required. These approvals are outlined in Table 4.1 and have been grouped into the following categories:

- *consistent approvals*: which are approvals that cannot be refused and are required to be issued consistently under Section 4.42 of the EP&A Act if the project is approved;
- whether approval is required under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);
- *other approvals*: approvals that are not expressly integrated into the SSD assessment process under the EP&A Act; and
- *approvals not required*: approvals that will have been required if the project was not SSD as per Section 4.41 of the EP&A Act.

Table 4.1 Approvals and licences required

Approval	Requirement
Consistent approvals	
Overview	Section 4.42 of the EP&A Act outlines that the approvals listed below cannot be refused if necessary for carrying out an approved SSD and are to be consistent with the terms of the development consent for the SSD.
An environment protection licence under Part 3 of the NSW *Protection of the Environment Operations Act 1997*	Section 48 of the *Protection of the Environment Operations Act 1997* requires an environment protection licence to undertake scheduled activities at any premises. Scheduled activities are defined in Schedule 1 of the *Protection of the Environment Operations Act 1997* and include the following premise-based activities that apply to the project: *17 Electricity generation* *(1) ...general electricity works, meaning the generation of electricity by means of electricity plant that, wherever situated, is based on, or uses, any energy source other than wind power or solar power.* *(2) Each activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if it meets the criteria set out in Column 2 of that Table.* The table referred to in Schedule 1, clause 17 specifies 'general electricity works' with 'capacity to generate more than 30 megawatts of electrical power'. The project will have a capacity that is greater than 30 MW and will therefore require an environment protection licence.
Approval under Section 138 of the *Roads Act 1993* (Roads Act)	Approval will be required under Section 138 of the Roads Act from the Council for works in, on or over a public road, or from the State to connect a road to a classified road.

Table 4.1 Approvals and licences required

Approval	Requirement
Other approvals	
Water access licence	No take from the surface water resource is proposed as part of the project, however, water extracted from the participating landholder's existing bore may be utilised to supplement potable water and imported water for construction use and operational irrigation. To use water from bores onsite, a Water Access Licence (WAL) would need to be obtained
Approvals not required under Section 4.41 of the EP&A Act	
Water Management Act 2000	A water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the *Water Management Act 2000* will not be required pursuant to Section 4.41 of the EP&A Act.

4.4 Pre-conditions to exercising the power to grant approvals

Pre-conditions that must be satisfied before the consent authority may grant approval for the project are provided in Table 4.2.

Table 4.2 Pre-conditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS/Appendix
State Environmental Planning Policy (Resilience and Hazards) 2021, Section 4.6 – Remediation of Land	A consent authority must not consent to the carrying out of any development on land unless, if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out.	The site is used incidentally for sheep grazing but has otherwise not been used for the grazing of livestock for a commercial purpose or for cropping. The land concerned is not: • within an investigation area; • on land which development for a purpose referred to in contaminated land planning guidelines is being, or is known to have been, carried out; or • for residential, educational, recreational or child care purposes, or for the purposes of a hospital. Contamination risks is considered in Section 6.11.2. The site is unlikely to be contaminated.	Section 6.11.2. Contamination risk

Table 4.2 Pre-conditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS/Appendix
State Environmental Planning Policy (Transport and Infrastructure) 2021, Section 2.48 – Determination of development applications—other development	Development likely to affect an electricity transmission or distribution network • The consent authority must give written note to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and must take into consideration responses received within 21 days. • The section applies to a development application including development carried out within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure is existing), or immediately adjacent to an electricity substation, or within 5 m of an exposed overhead electricity power line.	There is electricity infrastructure within the vicinity of the development boundary and the project will require connection to the electricity transmission network. TransGrid is the relevant electricity supply authority.	Section 2.5 Key features of the site and surrounds Section 5.3 Government agency and service provider consultation
State Environmental Planning Policy (Transport and Infrastructure) 2021, Section 2.118(2) – Development with frontage to classified road	The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that— (a) where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and (b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of— (i) the design of the vehicular access to the land, or (ii) the emission of smoke or dust from the development, or (iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and (c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.	The project will involve a relocation of site access and improvements to Goolma Road (an auxiliary short left turn bay and a channelised right turn bay) to facilitate the safe access of vehicles during construction.	Section 6.8 Traffic and transport Appendix L Traffic impact assessment
Dubbo Regional Local Environmental Plan 2022 – 5.14(2) – Siding Spring Observatory	Before granting development consent for development on land to which this Plan applies, the consent authority must consider whether the development is likely to adversely affect observing conditions at the Siding Spring Observatory.	The project will only require lighting at night for maintenance purposes. It is located relatively near to residential areas and the Wellington Correctional Facility and therefore unlikely to increase the impact on the observatory that is currently experienced from these other established land-uses.	Section 2.5 Site and surrounds

Table 4.2 Pre-conditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS/Appendix
Dubbo Regional Local Environmental Plan 2022 – 5.21(2) – Flood planning	Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development – (a) is compatible with the flood function and behaviour on the land, and (b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and (c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and (d) incorporates appropriate measures to manage risk to life in the event of a flood, and (e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	Flood risk is considered in Section 6.10 and in the Water Assessment (Appendix M). Flood risk from the nearby watercourse (Watercourse A) will be considered during detailed design.	Section 6.10 Surface water and flooding Appendix M Water assessment
Dubbo Regional Local Environmental Plan 2022 – Section 7.1(4) – Terrestrial biodiversity	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied— (a) the development is designed, sited and will be managed to avoid a significant adverse environmental impact, or (b) if a significant adverse environmental impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise the impact.	The project is not within land identified on the Terrestrial Biodiversity Map; however a portion of Lot 32 DP 622471 is identified in the map. Biodiversity impacts due to the project are not significant and have been minimised during design of the project. Potential impacts will be managed through the implementation of management measures, and offsetting for residual impacts that cannot be avoided.	Section 6.1 Biodiversity Appendix E Biodiversity Development Assessment Report

Table 4.2 Pre-conditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS/Appendix
Dubbo Regional Local Environmental Plan 2022 – Section 7.3(3) – Natural resource—riparian land and waterways	Development consent must not be granted to development unless the consent authority has considered the following matters— (a) the potential adverse impact of the development on the following— (i) water quality within the waterway, (ii) aquatic and riparian habitats and ecosystems, (iii) stability of the bed, shore and banks of the waterway, (iv) the free passage of fish and other aquatic organisms within or along the waterway, (v) the habitat of any threatened species, population or ecological community, (b) the likelihood that the development will increase water extraction from the waterway for domestic or stock use and the potential impact of any extraction on the waterway, (c) a description of the proposed measures that may be undertaken to ameliorate any potential adverse impact.	The project is within land identified on the Natural Resource—Water Map. Water impacts due to the project are not significant and will be minimised through detailed design and through the implementation of a suite of management and mitigation measures (described in Section 6.10.3).	Section 6.10 Surface water and flooding Appendix M Water assessment
Dubbo Regional Local Environmental Plan 2022 – Section 7.3(4) – Natural resource—riparian land and waterways	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development is consistent with the objectives of this clause and— (a) the development is designed, sited and managed to avoid potential adverse environmental impacts, or (b) if a potential adverse impact cannot be avoided—the development will be managed to mitigate the adverse impact.	As described in Section 2.8, the siting and design of the project has considered the nearby watercourse as a sensitive feature. Detailed design will consider how the project can be refined to avoid physical encroachment upon the waterway.	Appendix M Water assessment
Dubbo Regional Local Environmental Plan 2022 – Section 7.5 – Groundwater vulnerability	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied— (a) the development is designed, sited and will be managed to avoid a significant adverse environmental impact, or (b) if a significant adverse environmental impact cannot be avoided—the development is designed, sited and will be managed to minimise the impact.	The project is not expected to have any adverse impacts on groundwater levels or quality.	Section 6.10 Surface water and flooding Appendix M Water assessment

4.5 Mandatory matters for consideration

The mandatory matters for consideration that must be satisfied before the consent authority may grant approval to the project are listed in Table 4.3.

Table 4.3 Mandatory consideration for the project

Statutory document	Section reference	Mandatory consideration	Section/Chapter in EIS/Appendix
Considerations under the EP&A Act and Regulation			
Environmental Planning and Assessment Act 1979 (EP&A Act)	1.3	Relevant objects of the Act	Section 7.4 Statutory compliance
	4.15(1)	The provisions of any relevant environmental planning instruments (as outlined in Section 5.1 of this EIS, SEPP consolidation commenced 1 March 2022. Acts have not yet been updated to reflect SEPP consolidation; however the list below has been consolidated): • State Environmental Planning Policy (Planning Systems) 2021; • State Environmental Planning Policy (Biodiversity and Conservation) 2021; • State Environmental Planning Policy (Transport and Infrastructure) 2021; • State Environmental Planning Policy (Resilience and Hazards) 2021; and • *Dubbo Regional Local Environmental Plan 2022* (Dubbo LEP).	Chapter 4 Statutory context Appendix B Statutory compliance table
		The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.	Chapter 6 Assessment of impacts
		The suitability of the site for the development.	Section 2.6 Site suitability
		The public interest.	Chapter 5 Engagement Chapter 7 Justification
Mandatory relevant considerations under EPIs			
State Environmental Planning Policy (Resilience and Hazards) 2021, Section 3.7 – Consideration of Departmental guidelines	3.7	Consider whether the project is: • a hazardous storage establishment, hazardous industry or other potentially hazardous industry; or • an offensive storage establishment, offensive industry or other potentially offensive industry.	Section 6.5 Appendix N Hazards and risk assessment
State Environmental Planning Policy (Resilience and Hazards) 2021, Section 3.7 – Consideration of Departmental guidelines	3.12	Potentially hazardous or potentially offensive development. Matters for consideration by consent authority: • Current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development. • Whether any public authority should be consulted. • A preliminary hazard analysis. • Any feasible alternatives. • Any likely future land use of surrounding land.	Section 6.5 Appendix N Hazards and risk assessment

Table 4.3 Mandatory consideration for the project

Statutory document	Section reference	Mandatory consideration	Section/Chapter in EIS/Appendix
Dubbo LEP	4.1, 4.2, 5.21, 7.1, 7.2, 7.3, and 7.5.	Relevant objectives for the RU1 and SP2 zone. Relevant provisions concerning rural subdivision: • Clause 5.21 Flood planning; • Clause 7.1 Terrestrial biodiversity; • Clause 7.2 Earthworks; • Clause 7.3 Natural resource—riparian land and waterways; and • Clause 7.5 Groundwater vulnerability.	Section 4.2 Permissibility Section 6.1 Biodiversity Section 6.6 Land Resources Section 6.10 Surface water and flooding
Considerations under other legislation			
Biodiversity Conservation Act 2016	7.14	The likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	Section 6.1 Appendix E Biodiversity development assessment report

5 Engagement

5.1 Introduction

This chapter summarises the findings of the community and stakeholder engagement that has been and will continue to be carried out for the project during the subsequent response to submissions phase. It also identifies further engagement post project approval.

This chapter was prepared with reference to DPE's consultation guidelines - *Undertaking Engagement Guidelines for State Significant Projects* (DPIE 2021c).

5.2 Consultation approach

5.2.1 Community engagement plan

To ensure AMPYR delivered meaningful engagement that considered the needs of all stakeholders, AMPYR engaged EMM to develop a strategic Community Engagement Plan. The engagement plan was prepared in accordance with the consultation guidelines, which incorporates the adoption of best practice objectives for community participation in state significant projects: that it should be open and inclusive; easy to access; relevant; timely; and meaningful.

The engagement plan identified objectives for the engagement process; project stakeholders; and established communication channels, tools and activities for the duration of the project's planning and approvals process.

5.2.2 Identification of project and community stakeholders

When considering who to engage with for the project, four classifications of stakeholders were used (designated level 1, 2, 3, and 4) according to the anticipated levels of project impacts on them and interest and potential influence on project delivery outcomes. Table 5.1 outlines the assessment criteria and categories and Table 5.2 provides a summary of the project-specific stakeholder group classifications.

Table 5.1 Stakeholder assessment criteria and categories

Details	Level 1	Level 2	Level 3	Level 4
	Primary	Secondary	Tertiary	Quaternary
Project impacts on the stakeholder	High impact	Low impact	High impact	Low impact
Stakeholder levels of interest/influence on the project	High interest/ influence	High interest/ influence	Low/ medium interest/ influence	Low interest/ influence

Table 5.2 Project stakeholder group classification summary

Stakeholder classifications	Stakeholder group
1	• Federal and State regulatory authorities • State government elected representatives • Directly affected landowners • Dubbo Regional Council • TransGrid • Other nearby renewable energy proponents
2	• State government departments and agencies • Federal Government elected representatives • Nearby landowners/businesses • Utility service providers • Local Aboriginal groups/people • Media
3	• Local environmental and recreational groups • Indirectly affected landholders/businesses • Local agricultural groups • Utility service providers
4	• Wider regional community (ie Wellington, Dubbo, and Orange)

5.2.3 Consultation and engagement activity

The engagement process was designed to be inclusive, transparent, structured and meaningful for the local community and broader stakeholders. It included a variety of communication tools and activities to promote awareness of the project, provide information and encourage feedback. Examples of project communication materials can be found in Appendix C.

Multiple and diverse opportunities to engage and provide feedback were incorporated, including community information sessions, and traditional communication channels including letters, community newsletters and a project phone line as summarised in Table 5.3. This approach encouraged the representation of diverse stakeholder groups and age demographics within the consultation process.

Table 5.3 Project engagement activities summary

	Activity	Engagement summary
	Community information sessions	Two community information sessions were held to provide information about the project. An in-person session was held on 22 February 2022 at PCYC Wellington, and an online session was held over Zoom on 26 February 2022. Both sessions were advertised via a newsletter letterbox dropped to the surrounding community including the communities of Wellington, Montefiores, Maryvale, and Wuuluman. Nearby neighbours were also provided a copy of the newsletter via registered post and email. In total four people attended across the two sessions and provided feedback on the project. No feedback forms were received.
	Stakeholder briefings	The team has undertaken face-to-face briefings with government agencies, elected leaders and interested neighbours. These briefings were held to introduce the project, explain the planning process, and discuss potential project impacts. AMPYR and Shell also provided regular updates to these stakeholders.
	Traditional landowner consultation	The consultation process initially identified 19 Aboriginal stakeholder organisations with potential interest in the project. Following a notification process, six responded to be registered for subsequent consultation through the project. Three representatives participated in the field investigation of a study area (which incorporated the development boundary for the project) and discussions around tangible and intangible values as part of the Aboriginal heritage stakeholder consultation process for the AHCA (refer Appendix F).
	Letterbox drops	Three letterbox drops have taken place in the local community to help promote consultation opportunities and events. Letters were distributed to properties within 2 km of the project site in August 2021, December 2021 and September 2022. The letters provided residents with details of how to participate in consultation events and people were encouraged to contact the project team to provide feedback via a range of channels, including the 1800 number, website, and email inbox.
	Project website	A dedicated project website for the project was established: https://wellingtonbess.com/ This page is regularly updated to reflect latest project information and includes a feedback form.
	Project email address	A dedicated project email address – info@wellingtonbess.com – answers queries from neighbours and stakeholders. Four emails have been received from the community about the project. The project email address has been promoted on all community notifications and advertising.
	Project Phone line	A 24/7 phone line was established in August 2021 to allow local people and stakeholders to speak to a member of the project team. The 1800 number has been promoted on all community notifications and advertising.
	Community newsletter	A community newsletter was distributed in January 2022 via registered post and electronically to introduce the project, to provide an overview as to the status of the EIS, and to invite residents to be involved in engagement with the project.
	Advertising	AMPYR/Shell had placed advertising in the Daily Liberal and the Wellington Times to advertise the community information sessions and to advertise the SIA survey.

5.3 Government agency and service provider consultation

In accordance with the requirements of the SEARs, consultation with government authorities and service providers was conducted in the form of meetings, emails and phone calls. A summary of the consultation activities and their outcomes is provided in Table 5.4.

Table 5.4 Agency and service provider consultation

Stakeholder group	Stakeholder	Method and purpose of engagement
DPE	Iwan Davies, Tatsiana Bandaruk	A meeting was held on 18 August 2021 to introduce the project and to provide an overview of the proposed community consultation and technical assessments to support the Scoping Report and EIS. DPE required that Dubbo Regional Council and TfNSW be consulted prior to submission of the Scoping Report and that community consultation occur with nearby neighbours.
	Tatsiana Bandaruk May Patterson Elisha Dunn Nestor Tambo	Consultation with DPE was undertaken in the lead-up to lodgement of the EIS for public exhibition to discuss the outcomes of the impact assessment and discuss issues for finalisation in the EIS.
Elected representatives	Hon. Dugald Saunders	Engagement via email correspondence dated 28 January 2022 providing an overview of the project and EIS status. AMPYR, Shell, and EMM met with Mr. Saunders on 2 February 2022 to provide a high-level overview of the project. AMPYR and Shell's plans for future community engagement activities were discussed and EMM provided an overview of the key issues for assessment and the technical assessments that would be carried out to support the EIS.
	Hon. Barnaby Joyce	Engagement via mail correspondence dated 28 January 2022 to provide an overview of the project and an invitation to provide further briefing regarding the project. No response from the office was received.
	Hon. Andrew Gee	Engagement via mail correspondence dated 28 January 2022 to provide an overview of the project and an invitation to provide further briefing regarding the project. AMPYR and Shell met with Mr. Gee's advisor on 18 March 2022 to provide a high-level overview of the project. AMPYR and Shell's plans for future community engagement activities were discussed. An overview of the key issues for assessment and the technical assessments that would be carried out to support the EIS was covered.
Dubbo Regional Council	Stephen Wallace, Lisa Grisinger, Murray Wood, Natasha Comber	A meeting was held with on 17 August 2021 to introduce the project and to seek feedback as to what issues ought to be considered in developing the concept design and in undertaking environmental impact assessments. Council emphasised the need to consult closely with its traffic and planning team during preparation of the EIS and access design. Council further recommended that opportunities for local employment and employment of Aboriginal persons be pursued during construction and operation.
	Julian Geddes	A meeting was held on 26 August 2021 regarding the project and the proposed access. Council agreed with TfNSW's recommendation to consult with the proponents of the Wellington Solar Farm and Uungula Wind Farm particularly with regards to construction scheduling.

Table 5.4 Agency and service provider consultation

Stakeholder group	Stakeholder	Method and purpose of engagement
	Council officers: Stephen Wallace, Josie Howard Councillors: Mathew Dickerson, Richard Ivey, Jessica Gough	AMPYR and EMM met with Dubbo Regional Council officers and elected representatives on site on 22 February 2022 to provide a project update, to show attendees the site and the location proposed to be developed for the project, and to answer any questions regarding the project. Dubbo Regional Council emphasised the need to protect strategic agricultural land and encouraged AMPYR and Shell to enter into a VPA or separate program so that benefits from the project can be wider experienced.
	Infrastructure, Planning and Environment Committee	AMPYR presented to the Dubbo Regional Council Infrastructure, Planning and Environment Committee on 10 March 2022. The presentation provided a high-level overview of the project, community consultation and the key issues for assessment and the technical assessments that would be carried out to support the EIS. Questions from the committee included topics such as local employment opportunities and ongoing benefits to the Wellington township.
	Lisa Grisinger, Murray Wood, Stephen Wallace, Natasha Comber, Josie Howard, Luke Ryan, Dennis Valantine	AMPYR, Shell and EMM representatives met on 8 August 2022 to discuss the project status, structure of the voluntary planning agreement (VPA), and outcomes of the traffic impact assessment. The site access intersection upgrade options were presented, to which Council representatives provided in principal support for the concept design, subject to detailed design. Further consultation was committed in relation to the VPA and detailed design of the site access works during subsequent phases of the planning approval process.
TfNSW	Alexandra Power	A meeting was held on 4 August 2021 to introduce the project and to seek feedback as to what issues ought to be considered in developing the concept design and in undertaking environmental impact assessments. In this meeting TfNSW emphasised the requirement to consider cumulative traffic associated with nearby renewable energy projects.
	Andrew McIntyre	Engagement via a phone call was held with Andrew McIntyre on 20 August 2021 regarding the project and the proposed access. TfNSW reinforced the need to consider construction scheduling together with nearby renewable energy projects. TfNSW further recommended that access be via Twelve Mile Road be considered rather than Goolma road as such an arrangement would possibly provide a safer connection to the roadway. Lastly, TfNSW recommended that further consultation be undertaken with Dubbo Regional Council, and the proponents of the Wellington Solar Farm and Uungula Wind Farm.
	Alexandra Power, Bevan Crofts	Engagement via email correspondence dated 24 February 2022 to confirm that the TIA would be considering cumulative traffic impacts arising from the Uungula Wind Farm and to seek additional information concerning the intersection upgrade at Goolma Road/ Twelve Mile Road beyond that information which had been made publicly available. No response was received.
	Alexandra Power	A meeting was held on 22 March 2022 to consult with TfNSW regarding its requirements for the TIA and details concerning the relocated access and the need for turn treatments on Goolma Road. TfNSW requested that a strategic plan be provided prior to the submission of the EIS to provide feedback and in principle approval on the proposed design.

Table 5.4 Agency and service provider consultation

Stakeholder group	Stakeholder	Method and purpose of engagement
	Kylie-Anne Pont	A draft concept intersection design for the proposed site access was forwarded to TfNSW via email on 16 May 2022 for consideration and feedback. This matter was followed up with further correspondence via email on 7 July 2022 and again on 21 July 2022 to seek feedback on the impact assessment approach and site access concept design prior to exhibition.
	Andrew McIntyre	The matter was raised again via email and phone on 25 July 2022 and again via phone on 31 August 2022. Phone and email consultation with TfNSW during September and October 2022 was undertaken to discuss the proposed site access arrangement off Goolma Road, timing of the committed Goolma/Twelve Mile Road intersection upgrade works by CWP Renewables, and access intersection design issues. Consultation with TfNSW is ongoing and will continue during the EIS exhibition and subsequent phases of the project in relation to access options, intersection design and any other matters raised during EIS exhibition.
TransGrid	Tim Barrass, Nirvana McNaughton	A meeting was held on 2 June 2021 to introduce AMPYR and Shell and the project. TransGrid outlined the requirements for a grid connection enquiry and the overall grid connection application process were discussed.
	Natalie Clark	A Grid Connection Enquiry was formally submitted to TransGrid on 18 June 2021.
	Nirvana McNaughton	A Connection Process Agreement kick-off meeting was held on 28 January 2022.
	Nirvana McNaughton, Stephen Hodgkinson, Prakash Mistry	Consultation was undertaken with TransGrid representatives throughout July-September 2022 in regards to upgrade requirements for the Wellington Substation for consideration within the EIS and associated technical assessments. Upgrade requirements are subject to further design by TransGrid through subsequent phase of the project, and consultation with TransGrid will be ongoing through the next phases of the planning approval process.

5.4 Aboriginal stakeholder engagement

Aboriginal consultation for the ACHA is described in Section 6.2.2 and in Appendix F. Consultation has conformed with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) and included provision of information on registered Aboriginal parties (RAPs) and notification of the various field survey and excavation activities associated with the project. Additional detail is provided in Section 6.2.2.

5.5 Community stakeholders and businesses

Consultation with community stakeholders and businesses was conducted in the form of meetings, emails and phone calls. A summary of the consultation activities and their outcomes is provided in Table 5.5.

Table 5.5 Community stakeholders and businesses

Stakeholder	Consultation activities
NSW Farmers Association, Wellington Branch (local interested group)	• 13 September 2021: Telephone call to provide a high-level overview of the project. • 10 February 2022: Telephone call to provide an update regarding the project and its interactions with the Twelve Mile Road/Goolma Road intersection. • 7 March 2022: Social Impact Assessment questionnaire sent to request feedback on the project. • 24 June 2022: Email update regarding the project and its interactions with the Twelve Mile Road/Goolma Road intersection.
Soil Conservation Commission of NSW (nearby business)	• 9 December 2021: A letter was posted to the interest group to provide an update on the project. • 25 January 2022: A newsletter was posted to the interest group to provide an overview as to the status of the EIS, and an invitation to community information sessions. • 6 September 2022: A letter was posted to the interest group to provide an update on the project.
Wellington Correctional Centre (nearby facility)	• 23 September 2021: Email providing a high-level overview of the project. Email forwarded to Wellington Correctional Centre Business Manager and Infrastructure and Assets team. • 24 September 2021: Telephone call with Wellington Correctional Centre Business Manager answering questions regarding the project. • 5 September 2022: A letter was emailed to the Wellington Correctional Centre Business Manager to provide an update on the project.
Lightsource BP (proponent for Wellington North solar farm)	• 28 September 2021: Email providing a high-level overview of the project and to request a meeting. • 29 September 2021: Meeting with Lightsource BP to identify the potential for project interactions with the Wellington North Solar Farm. • March to September 2022: Regular interaction to confer on project timings and the interface between a Lightsource BP easement and the access way to the project.
CWP Renewables (proponent for Uungula wind farm)	• 28 September 2021: Email providing a high-level overview of the project and to request a meeting. • 29 September 2021: Telephone call to identify the potential for project interactions with the Uungula Wind Farm. • 27 July 2022: Telephone and email seeking feedback on progress and timing for design and construction of the intersection upgrade and realignment works at Twelve Mile and Goolma Roads, response to which was provided in August 2022 confirming targeted construction commencement later in 2022, with external road upgrades undertaken prior to commencement of construction in accordance with their project consent.
Endeavour Minerals Pty Ltd	• August 2022: Telephone call regarding Exploration Licence EL8505 over the project site, to which the proponent was advised that the company Endeavour Minerals no longer exists. Follow-up letter correspondence outlining the details of the proposed project, link to the project documents on the major projects website, and contact details for the proponent.
Modeling Resources Pty Ltd	• August 2022: Telephone call regarding Exploration Licence EL6178 over the TransGrid site. Follow-up letter correspondence outlining the details of the proposed project, link to the project documents on the major projects website, and contact details for the proponent.
R1	• 24 September 2021: Telephone call and email to provide an update on the project and to propose a face-to-face visit when COVID restrictions allow. • 8 February 2022: Telephone call to provide an update on the project, advise about the forthcoming Community Information Session and offer a face-to-face visit. • 22 February 2022: Face-to-face visit held at R1. • 23 June 2022: Telephone call to provide update on the project and discuss potential noise impacts on R1. Agreed to explore on-site mitigations at R1. • July to October 2022: Telephone calls, emails and site visit to pursue an agreement for on-site noise mitigation measures. Draft agreement was under consideration of R1 at the time of writing.

Table 5.5 Community stakeholders and businesses

Stakeholder	Consultation activities
R15	• 9 February 2022: Telephone call to provide an update on the project, advise about the forthcoming Community Information Session and the Social Impact Assessment Surveys. Followed up call with email copies of previous project letter drops. • 15 February 2022: Email to propose visit to take viewpoint photos from the residence. • 22 February - September 2022: Ongoing consultation and rescheduling for planned face-to-face visit. • 7 March 2022: Social Impact Assessment questionnaire sent to request feedback on the project. • 24 June 2022: Email to provide update on the project. Noted that the EIS will take R15 into consideration particularly for NVIA and VIA. Sent draft version of PHA due to concerns raised earlier in the year regarding electromagnetic radiation. • 17 August 2022: Video conference call held to describe project and understand the residents' concerns about development in the area. • August to October 2022: Further correspondence to discuss potential impacts, undertook face-to-face meeting on site and obtained photographs from the residence for the purpose of preparation of a photomontage. • 11 October 2022: copy of photomontage of unmitigated and mitigated scenarios.
Additional neighbour updates (CIS attendees and residences including R3, R16, R17, R20)	• February to September 2022: For residents who had provided email contact details to the project, an SIA questionnaire was sent as well as further project update emails, including the latest letter drop.
R14	• February to September 2022: Telephone calls to provide updates on the project.

5.6 Community views and outcomes

This section summarises the key findings of the community and stakeholder engagement carried out during the preparation of the EIS. Stakeholder and community views regarding the project have been understood through:

- the ongoing consultation and engagement activities described above; and
- feedback received from organisations via responses to SEARs.

In addition, it is noted that nearby neighbours were approached to undertake an in-depth interview as part of the project's SIA, however nearby neighbours, along with community members who attended community information sessions, declined to participate.

Feedback from stakeholders and the community has been varied and includes both positive and negative views on a range of topics.

Local people have a range of views, with most people recognising the benefits of the project to the state and the benefits that will flow to the region through the project's construction. Some raised concern about how environmental impacts will be managed – in particular noise and hazards. This concern was mostly from residents in the township of Wellington.

Stakeholders raised concern around the potential for cumulative traffic and transport impacts and social impacts.

Table 5.6 sets out the themes from community and stakeholder feedback, and AMPYR and Shells' response to what was heard.

Table 5.6 Themes from community stakeholder feedback

Theme	Details/questions from stakeholder	AMPYR/Shell response	Where addressed in the EIS
Economic benefits	Positive feedback about jobs creation, opportunities and sourcing. Local people and Dubbo Regional Council want to understand how the community will benefits during operation of the project.	AMPYR and Shell are committed to ensuring as many of the economic and social benefits of the project will be felt by the people living nearest to the facility. AMPYR and Shell will have a preference for its contractor to use local businesses in the construction supply chain and, where possible, seek to employ local people.	Section 6.7.4
Traffic and transport	Concerns about the potential for cumulative traffic impacts where there is overlap with the construction activities associated with nearby projects.	The TIA has been undertaken in consideration of potential cumulative traffic movements associated with construction traffic generated from this project coinciding with that of Wellington North solar farm and Uungula wind farm. It has shown that adequate level of service will be maintained under this worst case scenario and no significant adverse impacts are anticipated. A number of mitigation measures are proposed to improve site access and road safety.	Section 6.8.2, Appendix L; Section 6.7.4, Appendix O
Visual impact	Interest in what the facility will look like once built and questions as to whether it would be visible from private property.	AMPYR and Shell have designed the project to minimise the potential for visual impacts where possible. The project will represent a change in the viewshed for some surrounding receptors, however it will not introduce a radical change and would at least be partially integrated into the existing visual setting and surrounding built form. The visual impact assessment determined that, based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the proposed transmission towers, there will be moderate visual impact from R15 under the unmitigated scenario, which reduces to a low impact after mitigation through proposed landscaping around the BESS compound. Low visual impacts are predicted from all remaining viewpoints. Landscape screening is proposed to mitigate visual impacts at all viewpoint locations.	Section 6.9.3 Appendix J
Project site location	Strong feedback was received from local Council and DPE that the project should be setback from Goolma Road/Twelve Mile Road and from non-project related residences.	Preliminary noise modelling undertaken during development of the concept plan confirmed the need to develop the project setback from Goolma/Twelve Mile Roads and the closest residences to the north. As part of the NVIA, operational noise modelling incorporated noise mitigation measures in order to reduce potential noise impacts on nearby residences to the full extent feasible. An acoustic barrier (4m in height) will be installed to the north, east, south and west of the BESS footprint. To address residual noise exceedance at R1, negotiations have been undertaken for an agreement for treatment at the dwelling. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition.	Section 2.8, Section 6.3, Appendix K

Table 5.6 Themes from community stakeholder feedback

Theme	Details/questions from stakeholder	AMPYR/Shell response	Where addressed in the EIS
Planning process/ approvals	Interest in how the planning process would work. Interest in timelines.	AMPYR and Shell communicated information around planning process timeframes. AMPYR/Shell also developed graphics to help explain the steps that will be taken as part of the planning process. This is available on the project website and formed part of stakeholder and community presentations. It was also included in the project newsletter.	Chapter 5
Noise	Questions were raised as to how noisy the facility would be and whether local residents would be able to hear it. Questions were raised whether the facility would become louder as the components become older.	AMPYR and Shell communicated information as to sound power levels associated with the facility. The NIVA has incorporated construction and operational noise modelling to estimate potential noise impacts associated with the project. AMPYR and Shell will maintain and upgrade components as required to ensure that such components are operated in the intended manner.	Section 6.3, Appendix K
Hazards and safety	Concern was raised about the potential for fires that could be difficult to put out and spread to surrounding areas. Concern was raised as to the potential for smoke/toxic fumes from fires to blow into surrounding areas and the community. Concern was raised as to the potential for the project to generate electromagnetic fields.	The preliminary hazard assessment considers fire risk at the BESS and substation. Controls will be implemented (including protection and suppression systems) including an emergency shutdown. The project will be largely separated from nearby residential dwellings and fire effects are not expected to have an offsite impact. Monitoring equipment (eg fire and smoke detectors) will be installed to detect fire risk and initiate an emergency response. An APZ will be established around project infrastructure in accordance with guideline requirements.	Section 6.5, Appendix N

5.7 Ongoing engagement

Engagement with key stakeholders will continue through EIS exhibition and subsequent phases of the assessment, including:

- ongoing consultation and negotiations with Dubbo Regional Council, TfNSW relating to project planning and design issues, in particular associated with site access design, construction programming and contributions required for the project;
- ongoing consultation with other agencies as required to address issues raised during exhibition of the EIS and as part of preparation of the response to submissions report; and
- ongoing consultation with adjoining neighbours, landowners and local businesses through provision of project updates via email, project website, community newsletter, and another information session planned to coincide with EIS exhibition.

If development consent is received for the project, AMPYR and Shell will continue with ongoing consultation activities with both stakeholders and community members throughout the construction and operation of the project.

Principle engagement and consultation activities that will be considered beyond the EIS stage are:

- ongoing participation and regular local stakeholder briefings and meetings, including:
  - Dubbo Regional Council;
  - TfNSW; and
  - Adjoining neighbours and landowners;
- regularly updating and promoting information on the project website;
- regular community notifications and updates as the project progresses through construction and into operation; and
- ongoing operation of the community telephone line, email address, mailbox and website, with set response times for project queries and complaints.

6 Assessment of impacts

Preliminary environmental investigations were carried out during the preparation of the scoping report (EMM 2021) to identify the relevant key matters to be addressed in the EIS, and the required level of assessment (detailed or standard). The preliminary impact identification and assessment was informed by the *State significant development guidelines - preparing a scoping report: Appendix A to the state significant development guidelines* (DPIE 2021f).

The level of assessment identified for relevant and key environmental aspects are listed in Table 6.1.

Table 6.1 Level of assessment

'Detailed'	'Standard'
Heritage – Aboriginal	Heritage – historic
Biodiversity	Hazards and risks
Amenity – noise and vibration	Land resources
	Socio-economic
	Traffic and transport
	Amenity – visual
	Water resources

Other matters including air quality, contamination and waste are addressed in Section 6.11.

This chapter provides a summary of the environmental, social and economic impacts of the project. Impacts have been assessed with detailed technical specialist reports prepared where appropriate. Specialist technical reports are provided as appendices to the EIS (Appendix E – Appendix O) with the key impacts, outcomes and mitigation measures summarised in the following sections.

The length and detail of summaries are proportionate to the level of assessment (ie detailed versus standard). Mitigation measures have been identified to minimise, avoid and manage predicted impacts. A consolidated list of all mitigation measures contained in this EIS is provided in Appendix D.

6.1 Biodiversity

6.1.1 Introduction

A BDAR has been prepared by EMM and is provided in Appendix E. The BDAR assesses the potential impact of the project on terrestrial biodiversity under the NSW BC Act and the Commonwealth EPBC Act; describes biodiversity offset requirements under the Biodiversity Assessment Method (BAM); and recommends measures to minimise impacts. The relevant biodiversity SEARs and how they are addressed, are summarised in Appendix A and Section 1.4 of the BDAR.

A study area was adopted for the BDAR which represents an area larger than the disturbance boundary associated with the project, incorporating adjacent land areas that were considered as part of preliminary constraints identification. For the purpose of the EIS, this study area is subsequently referred to as the BDAR study area.

This chapter provides a summary of the BDAR including the existing environment and survey results, impact assessment and mitigation measures.

6.1.2 Existing environment

The vegetation within the project area has been impacted by past land use, particularly with ongoing grazing. Vegetation within the project area occurs as small patches of remnant native vegetation in variable condition, derived native grassland and exotic vegetation in the form of cropland.

The majority of the BDAR study area has previously been subjected to cropping or grazing, with very little to no native species cover and a lack of species diversity.

i Native vegetation

Background research and field surveys were undertaken to determine the presence of native vegetation within and surrounding the site. A likelihood of occurrence analysis was undertaken for each species, prior to field surveys, based on the PCTs/vegetation mapped within the BDAR study area.

A total of 107 species (53 native and 54 exotic) were recorded within the BDAR study area. Most of these species were native and exotic groundcovers, with a sparse shrub layer present and a total of two tree species. White Box (*Eucalyptus albens*) is the dominant canopy species with smaller occurrences of White Cedar (*Melia azedarach*) along the dry watercourse and west of the proposed access track.

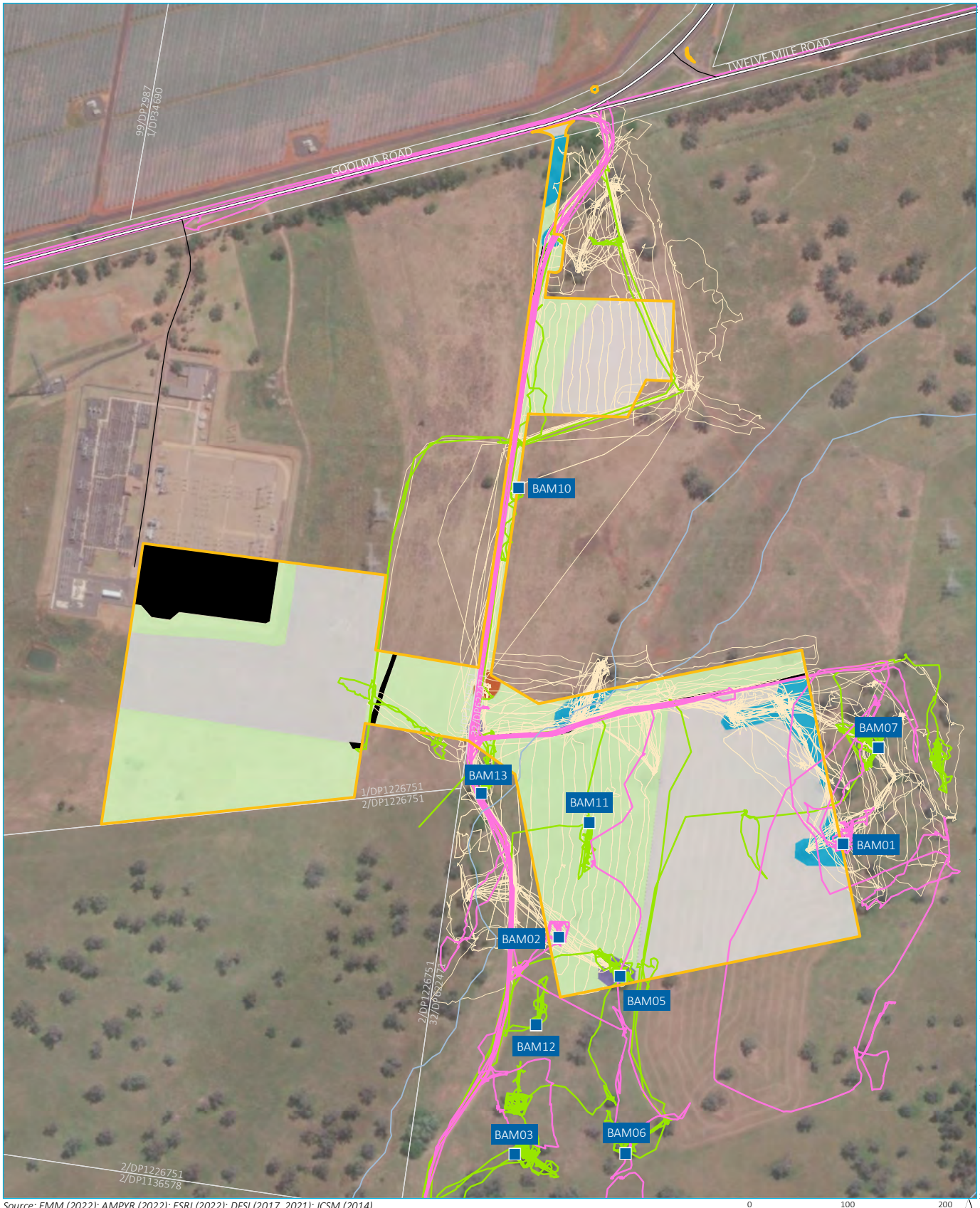
Four high threat weeds were also recorded within the BDAR study area and include:

- Bathurst Burr (*Xanthium spinosum*);
- Paspalum (Paspalum dilatatum);
- Saffron Thistle (*Carthamus lanatus*); and
- African Boxthorn (*Lycium ferocissimum*).

One PCT was recorded within the BDAR study area; PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion. PCT mapping and plot/transect locations are illustrated in Figure 6.1.

ii Threatened ecological communities

As outlined above one PCT was recorded within the disturbance boundary during field surveys; PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion. PCT 266 is associated with the critically endangered White Box – Yellow Box – Blakely's Red Gum grassy Woodland ecological community (Box Gum Woodland) listed under the BC Act and the EPBC Act. The vegetation within the BDAR study area conforms to the BC Act listing; however, it does not meet the condition thresholds listed under the EPBC Act.



Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017, 2021); ICSM (2014)

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KEY

- Subject land
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- Plot location
- Threatened species transect

Vegetation survey tracks

- July 2021
- November 2021
- Not vegetated
- Non-native

Plant community type

PCT 266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (Box Gum Woodland CEEC (BC Act))

- Moderate (intact)
- Low (intact)
- Poor (intact)
- DNG (moderate)

Plant community types and plot/transect locations

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.1

EMM
creating opportunities

iii Threatened species

a Flora and Fauna habitat

The project area has an extensive history of use for agricultural purposes, particularly for cropping and grazing. This has resulted in limited habitat values for threatened species but has the potential to support native species that might utilise hollows, small rocky areas or grassy woodland and grassland habitats for foraging. Waterways within the project area are highly degraded due to stock access, vegetation clearing and weed encroachment. The Macquarie River is located to the south of the project area; however there are weak vegetated links, represented by semi cleared grassy woodlands, between the Macquarie River and the vegetation within the project area.

Seven hollow-bearing trees occur within the project area. These hollows vary in size and have the potential to support mobile species such as birds and bats. Due to the lack of connectivity to surrounding patches of vegetation, it is not likely that arboreal mammals would utilise these hollows. A number of small nests were observed during targeted bird surveys; however, these were observed to be occupied by the Australian Magpie (*Gymnorhina tibicen*) and Brown Goshawk (*Accipiter fasciatus*). These species are not threatened or listed under the BC Act or EPBC Act. No large raptor nests were observed within the project area during the habitat assessment. Small areas of embedded rocky habitat also occur within the project area, which may be suitable for reptile species which utilise small rocks as refugia within a native grassland landscape.

b Credit species

Ecosystem credit species are those threatened species which are considered under the BAM (DPIE 2020) to have habitat that can be reliably predicted to occur within a PCT. Species credit species are those threatened species which, under the BAM, are considered to require assessment of habitat (or components of habitat) for those particular species.

The BDAR identified the ecosystem credit species predicted to occur within the project area based on PCTs present as generated by the calculator associated with the BAM. The potential for these species to occur within the project area was assessed in accordance with the BAM, the outcomes of which is reproduced in Table 6.2.

Table 6.2 Assessment of ecosystem credit species within the subject land

Scientific name	Common name	Biodiversity Risk Weighting	Justification for exclusion
Anthochaera phrygia	Regent Honeyeater (Foraging)	3.00	Not excluded
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	Not excluded
Callocephalon fimbriatum	Gang-gang Cockatoo (Foraging)	2.00	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	2.00	Excluded from all zones. No zones within the subject land contain *Allocasuarina* or *Casuarina* spp.
Chthonicola sagittate	Speckled Warbler	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Circus assimilis	Spotted Harrier	-	Not excluded

Table 6.2 Assessment of ecosystem credit species within the subject land

Scientific name	Common name	Biodiversity Risk Weighting	Justification for exclusion
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Daphoenositta chrysoptera	Varied Sittella	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Dasyurus maculatus	Spotted-tailed Quoll	-	Not excluded
Falco subniger	Black Falcon	-	Not excluded
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Glossopsitta pusilla	Little Lorikeet	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Grantiella picta	Painted Honeyeater	-	Excluded from all zones. No zones within the subject land contain mistletoe.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	2.00	Not excluded
Hieraaetus morphnoides	Little Eagle (Foraging)	1.50	Not excluded
Hirundapus caudacutus	White-throated Needletail	-	Not excluded
Lathamus discolor	Swift Parrot (Foraging)	3.00	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Lophoictinia isura	Square-tailed Kite (Foraging)	1.50	Not excluded
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	Not excluded
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	3.00	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Neophema pulchella	Turquoise Parrot	-	Not excluded
Ninox connivens	Barking Owl (Foraging)	2.00	Not excluded
Nyctophilus corbeni	Corben's Long-eared Bat	-	Not excluded
Petroica boodang	Scarlet Robin	-	Not excluded
Petroica phoenicea	Flame Robin	-	Not excluded
Polytelis swainsonii	Superb Parrot (Foraging)	2.00	Not excluded

Table 6.2 Assessment of ecosystem credit species within the subject land

Scientific name	Common name	Biodiversity Risk Weighting	Justification for exclusion
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	-	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	2.00	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	Not excluded
Stagonopleura guttata	Diamond Firetail	-	Not excluded
Tyto novaehollandiae	Masked Owl (Foraging)	2.00	Excluded from cleared vegetation zones (condition class 266_DNG_moderate)

Similarly, candidate species credit species predicted by the BAM calculator and assessed in accordance with the BAM in consideration of geographic and landscape constraints, which identified the candidate species listed in Table 6.3 as requiring further assessment.

Table 6.3 Candidate species credit species requiring further assessment

Scientific name	Common name	EPBC Act	BC Act	Flora or fauna
Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable	Vulnerable	Fauna
Burhinus grallarius	Bush Stone-curlew	-	Endangered	Fauna
Callocephalon fimbriatum	Gang-gang Cockatoo	-	Vulnerable	Fauna
Euphrasia arguta	Euphrasia arguta	Critically Endangered	Critically Endangered	Flora
Keyacris scurra	Key's Matchstick Grasshopper	-	Endangered	Fauna (assumed present)
Petaurus norfolcensis	Squirrel Glider	-	Vulnerable	Fauna
Phascogale tapoatafa	Brush-tailed Phascogale	-	Vulnerable	Fauna
Phascolarctos cinereus	Koala	Endangered	Vulnerable	Fauna
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	Fauna

The timing of the BDAR and submission of the EIS to DPE for review prior to exhibition (3 June 2022) coincided with an update to the BAM calculator (16 June 2022, version 54). Subsequent design changes resulted in the Key's Matchstick Grasshopper being included in this assessment post-adequacy review.

Advice was sought from BCS (August 2022) on this species and targeted survey requirements. The advice stated that additional surveys for Key's Matchstick Grasshopper can occur prior to the Response to Submissions (RtS) phase of the project's planning pathway (Appendix E).

At the time of submission, Key's Matchstick Grasshopper is assumed present. The proponent intends to conduct further surveys for Key's Matchstick Grasshopper in the near future subject to the availability of survey guidance, and commits to providing an updated BDAR to DPE as part of the RtS phase of the project. Targeted survey methods and results of assessment of candidate species are detailed in Sections 5.3.3 and 5.3.4 of the BDAR (Appendix E). In summary:

- no targeted flora species were found during the survey; and
- one target fauna species was observed during target surveys – Superb Parrot.

Targeted fauna survey results and transects are illustrated in Figure 6.2.

iv Groundwater dependent ecosystems

Groundwater will not be intercepted for the project, which therefore does not represent an aquifer interference activity and no further assessment of potential impacts on groundwater dependent ecosystems is required.

Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017, 2021); ICSM (2014)

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KEY

- Subject land
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- Hollow-bearing tree

Diurnal bird survey

- Bird survey point
- Bird survey transect

Mammal survey

- SAT survey
- Camera trapping
- Arboreal Elliot trapping

Nocturnal survey

- Call-playback
- Spotlight survey
- Spotlight transect

- Not vegetated
- Non-native

Plant community type

PCT 266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

- Moderate (intact)
- Low (intact)
- Poor (intact)
- DNG (moderate)

Targeted fauna results and transects

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.2

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6.1.3 Potential impacts

i Direct impacts

Without any measures to avoid, minimise or mitigate impacts, the project would result in the following direct impacts on biodiversity:

- loss of 9.47 ha of native vegetation associated with PCT 266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion, which conforms to the Box Gum Woodland CEEC listed under the BC Act; and
- loss and degradation of native fauna habitats (including seven hollow-bearing trees).

Wherever possible, direct impacts have been avoided and/or minimised through iterative project planning and preliminary constraints identification, which has allowed a range of impacts to be avoided and others to be minimised, through the following key measures:

- avoidance of better condition PCT 266 derived native grassland within the study area;
- minimisation of impacts to PCT 266_intact_ poor to moderate condition wherever feasible; and
- minimisation of direct impacts by utilising an existing access track within the subject land.

The original study area for the development design encompassed a larger area of Box Gum Woodland and derived native grassland. The final design has been reduced and will minimise impacts on Box Gum Woodland. Accordingly, the reduction in impact on Box Gum Woodland and derived native grassland also reduces the impact on native flora and fauna habitat.

Further, numerous additional mitigation measures to minimise potential for impacts on diversity are proposed as outlined in Section 6.1.4.

ii Indirect impacts

Section 8.2 of BAM (DPIE 2020d) requires the assessment of indirect impacts on native vegetation, threatened ecological communities and threatened species habitats.

The indirect impact area has been calculated using a 5 m buffer area. Due to the existing weed encroachment within the BDAR study area, the nature of the proposed works and the flat slope associated with the development boundary, a 5 m indirect buffer area was considered adequate. This is because weed encroachment is unlikely to be exacerbated or extend into areas which may be weed-free. Weed encroachment can be associated with slope gradient; however, due to the relatively flat landscape, slope is not considered to be an escalating factor.

Without any measures to avoid, minimise or mitigate impacts, the project would result in the following indirect impacts on biodiversity:

- erosion and sedimentation;
- weed introduction and spread; and
- disturbance from increased noise and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour).

Potential for erosion and sedimentation impacts has been assessed and a range of control measures will be implemented during the project to avoid and minimise potential impacts as far as practical, as summarised in Section 6.6.4.

Potential weed impacts will be mitigated as part of the project as summarised in Section 6.1.4. Similarly, a range of noise and dust mitigation measures are proposed as summarised in Sections 6.3.6 and 6.11.1ii respectively.

iii Prescribed and uncertain impacts

An assessment of prescribed and uncertain impacts is provided in Table 6.4.

Table 6.4 Assessment of prescribed impacts

Feature	Present	Description of features	Potential impact	Affected threatened species
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No	No geologically significant features are present within the development boundary	The project does not include geological features of significance; therefore this prescribed impact is not relevant to the project.	N/A
Human-made structures or non-native vegetation	Yes	Non-native grassland (cropping)	A species polygon has been created for the Superb Parrot. This species polygon intersects 3.43 ha of non-native vegetation and therefore will not generate species credits under the BAM. Mitigation measures to minimise impacts to the Superb Parrot ensure prescribed impacts to the species are addressed.	Superb Parrot
Habitat connectivity	No	N/A	Native vegetation and fauna habitats are highly fragmented in the development boundary. Ecosystem and species credit species predicted to occur in the development boundary predominantly comprise highly mobile birds and mammals, and therefore most species will not be impacted by fragmentation. For the less mobile Key's Matchstick Grasshopper, abundant suitable habitat is available within the locality. The design of the subject land results in minimal fragmentation and no isolation as surrounding suitable habitat remains connected.	N/A
Impacts of development on movement of threatened species that maintains their life cycle	No	N/A	The project is located in a fragmented and disconnected patch of sparse woodland, which limits existing movement of threatened species. Breeding habitat for Superb Parrot has been offset under the BAM. No additional breeding habitat of threatened species was found during the assessment. The project is unlikely to assist in the movement of threatened species and therefore is unlikely to have an impact.	N/A
Waterbodies, water quality and hydrological processes	No	N/A	The development boundary intersects three unnamed waterways. Although mapped as waterways, there is a lack of aquatic habitat and hydrological influence, including in periods of high rainfall. The first-order streams generally lack canopy or shrub stratum and consist of grasses whilst fragmented occurrences of native canopy vegetation occurs within the second-order stream riparian buffer. For this reason, the project is not expected to intersect groundwater given its shallow depth. Impacts on groundwater dependent ecosystems are not expected. Therefore, impacts on threatened species and ecological communities as a result of changes in water quality, water bodies and hydrological processes are not expected during construction or operation. Accordingly, management of this prescribed impact is not required.	N/A

Table 6.4 Assessment of prescribed impacts

Feature	Present	Description of features	Potential impact	Affected threatened species
Impacts of wind turbine strikes on protected animals	No	N/A	The project does not include wind turbines; therefore this prescribed impact is not relevant to the project.	N/A
Vehicle strikes	No	N/A	The project traffic impact assessment (Appendix L) concluded that the project would result in up to 100 light vehicle trips and up to 60 heavy vehicle trips per day during the construction phase, and minor increases in vehicle movements during operation. Construction traffic will be restricted to 10km/h onsite and will be enforced by signposting. Therefore, the project is not predicted to significantly increase animal vehicle strikes above existing levels. Accordingly, management of this prescribed impact is not required.	N/A

iv Avoidance, minimisation and management

During the course of technical investigations and project planning and design, the project boundary has been significantly altered to avoid identified environmental constraints, including areas of higher biodiversity values. Key measures that have been implemented by AMPYR during the development design to avoid and minimise impacts to biodiversity values are summarised and illustrated in Table 6.2 and Figure 6.1 of the BDAR respectively (Appendix E).

To compensate for unavoidable disturbance, biodiversity offsets will be provided. Minimisation, mitigation and amelioration measures to minimise the potential for development-related impacts on biodiversity are outlined in Table 6.8.

v Serious and irreversible impacts

An impact is to be regarded as serious and irreversible (SAII) if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or an ecological community becoming extinct.

One Serious and Irreversible Impacts (SAII) entity occurs within the BDAR study are Box Gum Woodland. The SAII entity has been assessed in accordance with the BAM.

One prescribed impact is expected to occur as a result of the proposal. The Superb Parrot species polygon includes 3.43 ha of non-native vegetation, which is not required to be offset under the BAM. Mitigation measures to minimise impacts to the Superb Parrot ensure prescribed impacts to the species are addressed.

vi Impacts not requiring offset

In accordance with the BAM (DPIE 2020d) impacts on vegetation zones and threatened species habitat do not require offsets where:

- a vegetation zone representative of a critically endangered or endangered ecological community has a vegetation integrity score less than 15;
- a vegetation zone representative of a vulnerable ecological community and/or threatened species habitat has a vegetation integrity score less than 17; and/or
- a vegetation zone that is not listed has a vegetation integrity score less than 20.

Table 6.5 provides a summary of the vegetation zones that do not trigger the above thresholds.

Table 6.5 Summary of impacts not requiring offsets – native vegetation

Vegetation zone	PCT	Name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
4	266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	PCT266_DNG_ moderate	8.47	10.4	0	-10.4	0

Areas not requiring assessment in accordance with the BAM (DPIE 2020a) include:

- existing roads;
- cleared and highly disturbed land; and
- watercourses.

vii Impacts requiring offset

a Native vegetation

Impacts to native vegetation requiring offsets include:

- direct impacts on 1 ha of PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (refer Figure 6.3).

A summary of the ecosystem credits required for all vegetation zones, including changes in vegetation integrity score, are provided in Table 6.6. A total of 27 ecosystem credits are required to offset the residual impacts of the project. A credit report is provided in Appendix F of the BDAR (Appendix E).

Offsets will be provided through implementation of the biodiversity offset scheme.

Table 6.6 Summary of impacts requiring offsets - native vegetation

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
1	266 – White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	PCT266_intact_moderate	0.06	56.6	0.0	-56.6	2
2		PCT266_intact_low	0.12	52.6	0.0	-52.6	4
3		PCT266_intact_poor	0.81	41.9	0.0	-41.9	21

b Threatened species

Impacts to threatened species habitat requiring offsets include:

- impacts on 5.41 ha of breeding habitat for the Superb Parrot; and
- impacts on 9.47 ha of habitat for Key's Matchstick Grasshopper

A summary of the species credits required for all vegetation zones occupied by the threatened species, including changes in vegetation integrity score, are provided in Table 6.7 and Figure 6.3. A total of 108 species credits are required to offset the residual impacts of the project. A credit report is provided in Appendix F of the BDAR (Appendix E).

Offsets will be provided in accordance with the biodiversity offset scheme.

Table 6.7 Summary of impacts requiring offsets - threatened species

Species	Vegetation zone name	Area (ha)/individual (HL)	Habitat condition (vegetation integrity) loss)	Candidate SAII	Species credits
Superb Parrot	PCT266_intact_low	0.12	-52.6	No	3
	PCT266_intact_moderate	0.06	-56.6		2
	PCT266_intact_poor	0.64	-41.9		13
	PCT266_DNG_moderate	4.58	-10.4		24
Key's Matchstick Grasshopper	PCT266_intact_low	0.12	-52.6	No	3
	PCT266_intact_moderate	0.06	-56.6		2
	PCT266_intact_poor	0.81	-41.9		17
	PCT266_DNG_moderate	8.47	-10.4		44

c Biodiversity offset strategy

Offsets will be provided in accordance with the biodiversity offset scheme. AMPYR may explore options to create and retire biodiversity credits for the project through establishment of a biodiversity stewardship site. However, due to the relatively small biodiversity credit requirement of the project, the offset liability for the project is likely to be primarily or entirely met through a combination of the following methods:

- purchase and retirement of available like-for-like biodiversity credits from the biodiversity offsets trading market; and/or
- payment to the biodiversity conservation fund.

Source: EMM (2022); AMPYR (2022); ESRI (2022); DFSI (2017, 2021); ICSM (2014)

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KEY

- Subject land
- Impacts requiring offsets
- Impacts not requiring offsets
- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary
- Not vegetated
- Non-native

Plant community type

PCT 266 | White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

- Moderate (intact)
- Low (intact)
- Poor (intact)
- DNG (moderate)

Offset requirements

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.3

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viii EPBC listed communities and threatened species

The following communities and species were assessed for significance under the EPBC Act:

- Listed communities:
  - White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland;
  - Weeping Myall Woodlands;
  - Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions;
  - Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland;
  - Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia;
  - Natural Temperate Grassland of the South Eastern Highlands;
  - Poplar Box Grassy Woodland on Alluvial Plains.
- Threatened species:
  - Superb Parrot (Polytelis swainsonii);
  - Regent Honeyeater (Anthochaera phrygia); and
  - Swift Parrot (Lathamus discolor).

The assessment of significance undertaken as part of the BDAR concluded that the project will not result in a significant impact to any Matters of National Environmental Significance and a referral under the EPBC Act is not required, as the project is not considered to be a controlled action.

6.1.4 Management measures

As outlined in Section 6.1.3, iterative project planning and preliminary constraints identification has significantly reduced impacts to biodiversity values, in particular avoidance of environmental constraints, including impacts on PCT 266, which conforms to the CEEC White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grasslands (Box Gum Woodland), and threatened species habitat as far as practicable.

Table 6.8 summarises the avoidance and minimisation measures that have been implemented to minimise the potential for development-related impacts on biodiversity, along with additional proposed mitigation measures to be implemented in subsequent phases of the project.

Table 6.8 Impact minimisation, mitigation and amelioration measures

Impact	ID	Action	Intended outcome	Timing	Responsibility
Removal of Box Gum Woodland and derived native grassland	BIO01	Retain vegetation where possible within the transmission line connection. Limit the removal of vegetation to necessary trees and trimming of branches.	Minimise the direct impact to vegetation within the transmission line connection by managing and maintaining vegetation as opposed to complete removal of all vegetation.	Construction; Post-construction	Contractor
	BIO02	Locate the access of the BESS on most of the existing access track within the project boundary.	Minimise removal of Box Gum Woodland and derived native grassland.	Design	Contractor
	BIO03	Following construction, include species consistent with PCT 266 into landscaping and vegetation screens.	Increase the floristic and structural diversity present in the subject land consistent with PCT 266.	Post-construction	Contractor
Removal of hollow-bearing trees	BIO04	Minimise removal of hollow-bearing trees which occur within the project boundary, where possible. A visual screening area is included in the project boundary, where efforts to retain the 7 remaining trees will be made. Although this is the aim of AMPYR and SHELL, impacts to hollow-bearing trees include the removal of the 7 trees within the subject land for the purpose of this assessment.	Minimise impact to hollow-bearing trees within the project area.	Design	Contractor
	BIO05	Install 7 nest boxes or equivalent within the cadastral boundary of the site in remnant woodland. As a priority, the removed hollows should be retained to be re-installed on remnant trees within the site. Where this is not possible, nest boxes can be used.	Supplement hollow-bearing tree loss as a result of the project	Construction	Contractor
Removal of potential habitat for native fauna (hollow-bearing trees) (for all species including the Superb Parrot)	BIO06	Pre-clearance surveys to be conducted prior to removal of hollow-bearing trees (at the locations specified in the BDAR).	Mitigate injury to potential fauna species inhabiting hollows.	Pre-construction	Contractor; Qualified Ecologist
	BIO07	If the Superb Parrot is found to be utilising a hollow, a hollow inspection will be undertaken using an elevated work platform, tree climber and/or inspection camera. If eggs are present in the hollow, these eggs will be collected and provided to a wildlife carer for raising, prior to release. If hatchlings are present, removal of the hollow-bearing tree must be postponed until birds have fledged and left the hollow for the breeding season (September to December).	Avoid impact to the hatchlings during the breeding season.	Pre-construction	Contractor

Table 6.8 Impact minimisation, mitigation and amelioration measures

Impact	ID	Action	Intended outcome	Timing	Responsibility
Removal of logs and debris from the subject land	BIO08	Retain hollow logs and debris to be used post construction in remnant woodland.	Retain and improve potential fauna habitat within the indirect impact area and project area post construction.	Post-construction	Contractor
Indirect impacts on White Box woodland to be retained	BIO09	Retained trees will be marked for their protection during construction, where required. Markings will be monitored and reapplied where necessary during construction.	Avoid indirect impact to retained trees.	Pre-construction	Contractor
	BIO10	All workers to be made aware of ecologically sensitive areas and the need to avoid impacts. This includes adjacent native vegetation.	Avoid unintentional impacts to Box Gum woodland and native vegetation.	Pre-construction	Contractor
Erosion and sedimentation to the indirect impact area	BIO11	Sediment controls, including fencing and sediments traps, should be installed in any areas where works will occur in proximity to low lying vegetation. This includes along the boundary of the unnamed watercourse.	Avoid increased sedimentation and erosion of the unnamed watercourse within the project area.	Pre-construction	Contractor
Weed introduction and spread	BIO12	Remove weeds prior to clearing. Weeds are to be stockpiled appropriately prior to removal from the subject land to avoid the spread of seed and other propagules.	Minimise weed introduction and spread.	Construction	Contractor
	BIO13	Weed hygiene protocols are in place prior to entering the subject land. This includes wash-down procedures to all plant and machinery.	Avoid weed introduction from outside of the project boundary.	Construction	Contractor
Disturbance	BIO14	Monitor dust levels and implement suppression strategies where required such as wetting down dirt roads or reducing vehicle speeds.	Reduce dust settlement on native vegetation and habitat for native species.	Construction	Contractor

6.1.5 Conclusion

A BDAR (Appendix E) has been prepared to inform this EIS, which was prepared in accordance with the BAM (DPIE 2020d) and biodiversity related SEARs issued by DPIE.

EMM has carried out a number of technical assessments as part of an iterative project design and assessment process, which has ensured the avoidance and minimisation of impacts to biodiversity values as far as practicable. Residual impacts include:

- loss of 9.47 ha of native vegetation and associated habitat for fauna species;
- loss of 9.47 ha of White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion CEEC listed under the BC Act;
- loss of seven hollow-bearing trees; and
- indirect impact to a further 1.37 ha of native vegetation, associated habitat for fauna species and the White Box grassy woodland CEEC.

The project requires 27 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 42 species credits for the Superb Parrot and 66 species credits for Key's Matchstick Grasshopper. Key's Matchstick Grasshopper is assumed present in this BDAR due to the late introduction of the species into the assessment as a result of BAM data updates. The proponent intends to conduct further surveys for Key's Matchstick Grasshopper and commits to providing an updated BDAR to DPE as part of the Response to Submission phase of the project. AMPYR will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The project is not expected to result in significant impacts to the Superb Parrot. A referral under the EPBC Act is not required, as the project is not considered to be a controlled action.

6.2 Aboriginal heritage

6.2.1 Introduction

An Aboriginal cultural heritage assessment (ACHA) was prepared by EMM in support of the EIS (refer Appendix F). The ACHA documents the results of archaeological investigations undertaken to identify the extent and significance of any physical remains and intangible values of past Aboriginal visitation, use and occupation within the project area.

The ACHA was prepared in general accordance with the *Code of Practice for Archaeological Investigation in NSW* (DECCW 2010), and guided by the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011). The relevant SEARs and how they have been addressed, are summarised in Appendix A and Section 1.2 of the ACHA (Appendix F).

The ACHA was undertaken with reference to an ACHA study area, which is representative of the local and broader regional are considered to identify local and regional Aboriginal heritage context.

6.2.2 Consultation

Aboriginal consultation for the ACHA has conformed with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010) and included provision of information on registered Aboriginal parties (RAPs), and notification of field survey associated with the project.

The consultation process initially identified 19 Aboriginal stakeholder organisations with potential interest in the project area. Following a notification process, six responded to be registered for subsequent consultation through the project, including the Wellington Local Aboriginal Land Council (LALC) and a number of Wiradjuri traditional owner groups. The one-day field program included the participation of three of these organisations; Gallanggabang Aboriginal Corporation, Wellington Valley Wiradjuri Aboriginal Corporation, and Binjang Wellington Wiradjuri Heritage Survey.

6.2.3 Existing environment

i Landscape overview

The project is located within the NSW South Western Slopes Bioregion and the Inland Slopes Subregion (NSW NPWS 2003), which is characterised by steep, hilly, undulating ranges and granite basins, lakes and wide valleys. The river valley of the Wambuul-Macquarie River is located approximately 2 km south of the project area and represents a significant natural feature that is well documented as an Aboriginal meeting place and an area with cultural value.

ii Geology and topography

The bioregion corresponds to the eastern part of the Lachlan Fold Belt, consisting of northerly and north-westerly trending folds of Cambrian to Early Carboniferous sedimentary and volcanic geology. According to the Dubbo 1:250,000 Metallogenic Geology Map (SI5504), the project area is situated within a region of Silurian and Devonian geological sequences. The majority of the disturbance area is within the Mumbil Formation, with some Cuga Burga Volcanics also present and Lue Beds neighbouring to the west.

In relation to Aboriginal stone resources for the manufacture of stone tools, chert, quartz and tuff have been reported as raw materials used for artefacts in the region (cf. NGH 2018). However, this would require surface outcrops to be present for Aboriginal resource extraction; no visible outcrops of these materials were observed during the archaeological survey. In addition, the presence of sandstone in certain environmental contexts (such as sandstone platforms within creek lines or rockshelters on sharp escarpments) could suggest the presence of grinding grooves or engraving sites. No such sites have been documented nearby, and no sandstone was observed during the archaeological survey. The low topography of the project area limits the potential for rockshelters.

iii Soil landscapes

The topography of the project area is characterised by low undulating to rolling hills with elevation between 300–500 m. Local relief is unlikely to exceed 100 m and slopes are likely to be gentle to moderate.

Soil landscape mapping by the Soil Conservation Service of NSW and DPIE indicates the majority of the project area is classified as the Nanima Soil Landscape (Murphy and Lawrie 1998). This soil landscape is classified as a shallow soil landscape on moderate to steep slopes with rock outcropping and is only located within 30 km of Wellington. The subsoils are derived from the underlying parent rock and the topsoil is mostly a homogenised layer derived from all parts of the slope. On the lower and upper slopes of the project area, this soil landscape typically presents as a dark red/brown loam to clay loam on valley floors (typically 15 cm, but up to 30 cm), overlying reddish brown clay to 120 cm, significantly decreasing in depth further up slope. Given the shallow nature of this topsoil, it is unlikely that cultural material will be present.

The Bodangora Soil Landscape is present in a small portion of the north section of the project area. While this soil landscape is similar to Nanima, it is a more hardsetting gravelly dark red/brown fine sandy loam to sandy clay loam (up to 35 cm) on lower and mid-slopes. Similarly to the Nanima soil landscape, this landscape is a transferred soil landscape made up of mostly eroded parent materials washed from areas directly upslope (ie colluvium). Given the shallow nature of these deposits is unlikely to be able to retain archaeological material of significant depth or stratification, even if previously deposited by past Aboriginal occupation.

iv Hydrology

This bioregion has three significant wetlands; the Barmedman/Yiddah Creek Floodplain, Lake Burrendong Reservoir and Wiesners Swamp. The project area is approximately 18 km northwest of Lake Burrendong, a man-made reservoir which the Wambuul-Macquarie River flows into. This is a flood prone region, due to the relatively low-lying topography.

The hydrology of the project area is presented in Figure 6.22. The nearest perennial watercourse is the Wambuul-Macquarie River (9th order), which is located approximately 2 km south of the project area. The headwaters of two ephemeral unnamed tributaries (1st order) of the Wambuul-Macquarie River run flow in a southwesterly direction adjacent to the northeast of the project area. These drainage lines confluence in the southern half to the project area to a 2nd order ephemeral drainage line that edges on the western border of the project area.

Established creek corridors for any of these mapped waterways are not visible on current aerial photography, and likely only flow in periods when it is actively raining. Alternatively, the mapping may reflect erosion scours as a result of recent de-vegetation. In either case, they would not be suitable for prolonged or long term occupation in the past.

v Flora and fauna

Due to the diversity of the bioregion there are a broad range of flora that would have provided resources for Aboriginal people. An assessment undertaken by NGH Environmental to the north of the project area (NGH 2017, 2018) found White Box (*Eucalyptus rossi*) grassy woodland to occur in the upper slopes sub-region of the NSW South Western Slopes Bioregion, and Blakely's Reg Gum (*Eucalyptus blakelyi*) and Yellow Box (*Eucalyptus melliodora*) grassy tall woodland on the lower hillslopes and valley flats. The vegetation communities occurring within the vicinity of the current project area would have been dominated by grey box (*Eucalyptus microcarpa*) and white cypress pine (*Callitris glaucophylla*). Animals in the area that would have been used by Aboriginal people as food resources include kangaroos and wallabies, possums and other small marsupials (such as bandicoots), snakes, emu, wild turkey, echidna, native ducks, fish and eels, and freshwater mussels. There are a diverse range of woodland and wetland birds recorded in the region which could have provided further resources and would have helped to maintain ecosystems, such as Brolga (*Grus rubicundus*), parrots and honeyeaters.

The majority of the project area appears to be cleared grazing farmlands containing exotic grass species. Very little remnant vegetation has been identified in the project area. Generally speaking, for Aboriginal carved or scarred trees, the eucalypt gums and boxes listed above would have been suitable for cultural use, but likely have been cleared in the historic past.

vi Land use and disturbance

The project area has a history of intensive agricultural and pastoral use. The majority of the area has been utilised for grazing and crop production since European settlement in the mid-1800s. As evidence on current aerials, some ploughing and/or slashing has occurred within some areas of the project area, likely disturbing the topsoil due to the use heavy machinery. The impacts from farming activities over many decades has likely disturbed and potentially destroyed any cultural material present within the project area.

vii Ethno-historical context

The project area is on Wiradjuri land.

Aboriginal people of the project area spoke the Wiradjuri language, whose territory represented the largest of all the Aboriginal groups recorded in NSW. Wiradjuri Country extends from Dubbo south to Albury, and Ivanhoe east to the Blue Mountains. *Binjang* ('the beautiful valley') is the Wiradjuri name for the Wellington Valley.

Wellington was a focal point of post-contact activity in the early 1800s and is notable as the site of one of the first Aboriginal mission sites in NSW. Three missions – some operating concurrently – were established at Wellington, several kilometres south of the project area. One post-contact Aboriginal camp, known as the Black's Camp and located ~3 km south of the project area, is also listed on the State Heritage Register.

However, while historical information provides several observations in relation to the early nineteenth century Aboriginal society, in particular at nearby Wellington and along the Wambuul-Macquarie River, no site-specific areas of activity were identified. No intangible values for the project area have been identified to date, but the Wellington Valley Wiradjuri Aboriginal Corporation indicated increasing development in the region is having a cumulative impact on the cultural landscape.

viii Archaeological context

Previous studies of the region are sparse, and primarily constrained to cultural heritage management studies for various residential and/or industrial activities. These studies all suggest generally sporadic and/or ephemeral past use of the region, with a focus of occupation and visitation on major waterways such as the Wambuul-Macquarie River and Bell's River.

The ACHA included a review of Heritage NSW's AHIMS database. The database identified two sites within/within proximity to the project area (refer Figure 6.4). One (AHIMS 36-4-0201) is noted as 'not a site' on the AHIMS database and can be considered non-extant for the purposes of this assessment. The recorded location of the other, AHIMS 36-4-0203, is likely in error.

Based on the regional information and characteristics of the project area, it is unlikely that substantial cultural materials are present as it lacks the natural and topological features associated with long term occupation. Based on regional modelling, sites expected in the project area where disturbance has not resulted in their loss are: isolated artefacts and/or low density artefact scatters associated with low order drainage lines; and, to a lesser extent considering historic de-vegetation, culturally modified trees.

a Field survey

An archaeological field survey was undertaken by EMM archaeologists and representatives of the RAP organisations and native title applicants. The field survey undertook a general overview of the project area, and a targeted investigation of the proposed surface activities for the project, including the power line corridor and access track upgrade (refer Figure 6.5).

No Aboriginal objects or areas of subsurface potential were identified within the project area. No intangible values or places within the project area were identified by the participating RAPs.

Source: EMM (2022); AMPYR (2022); ESRI (2021); OEH (2021); DFSI (2017); DPI (2015); ICSM (2014); GA (2011)

0 0.5 1 km

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AHIMS sites

KEY

- Development boundary
- Major road
- Waterbody

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order
- 9th order

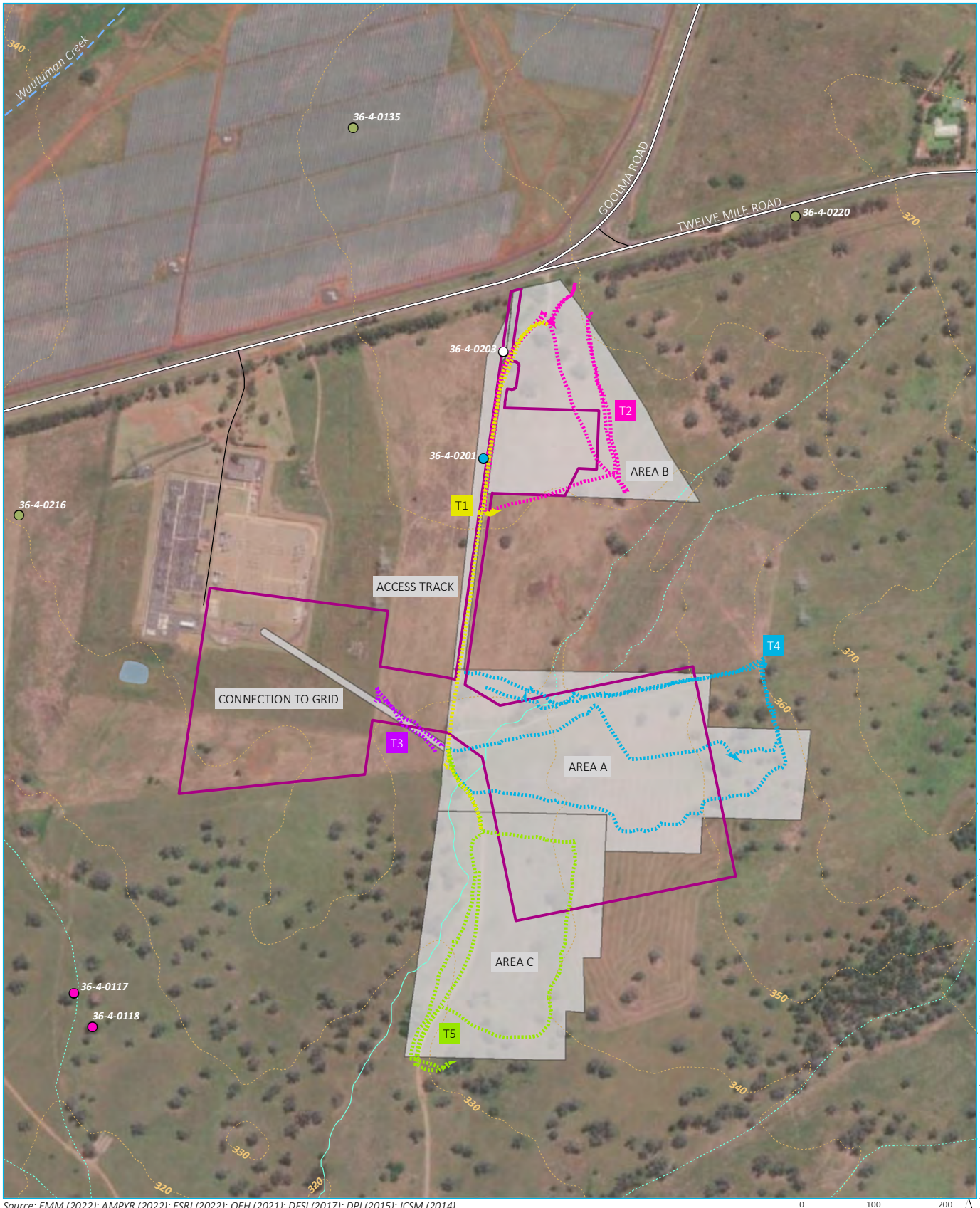
AHIMS site type*

- Burial site
- Culturally modified tree (carved or scarred)
- Isolated artefact
- Low density artefact scatter (1-10)
- Not a site
- Post contact site
- Potential archaeological deposit
- Undefined artefactual site

* Two AHIMS records have a restriction applied, may or may not be within the view extent

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.4

EMM creating opportunities



Source: EMM (2022); AMPYR (2022); ESRI (2022); OEH (2021); DFSI (2017); DPI (2015); ICSM (2014)

0 100 200 m

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ACHA survey transects

KEY

- Development boundary
- Study area
- Major road
- Minor road
- Topographic contour (10 m)
- Waterbody
- Strahler stream order
  - 1st order
  - 2nd order
  - 3rd order
- AHIMS site type*
  - Isolated artefact
  - Not a site
  - Potential archaeological deposit
  - Undefined artefactual site
- Survey transect
  - Transect 1
  - Transect 2
  - Transect 3
  - Transect 4
  - Transect 5

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.5

EMM creating opportunities

* Two AHIMS records have a restriction applied, may or may not be within the view extent

6.2.4 Potential impacts

i Statement of significance

From a scientific perspective, the archaeological investigations undertaken as part of the ACHA found no evidence of surface material and predicted that the nature of any subsurface material, if present, would be too sporadic and isolated to be traceable through test excavation. As such, the project area is considered to have low-nil archaeological significance. The project area has been subject to some historical disturbance due to the agricultural use of the site. As such, the site is considered to have limited aesthetic values. No association with key historical individuals or organisations has been identified through the ACHA that may warrant its identification under the historic criterion.

No project specific cultural values have been vocalised by the RAPs for the project area to date. Comments received from Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC) during the ACHA review period (refer Appendix B.6 of the ACHA, Appendix F), indicate that the project area was used ephemerally as a movement corridor between Wuuluuman Creek and the Wambuul-Macquarie River; and retained some aesthetic appeal. From a cultural perspective, WVWAC assert that the broader landscape has moderate cultural value. And as such, the proposed development should minimise its visual impacts to the locale where feasible.

More broadly, discussions have identified the importance of the Wambuul-Macquarie River to the Aboriginal community, but these are both some distance from the project area; and cannot be seen, nor be seen from, the project area. As such, it is concluded that the project area has no specific cultural values aside from the broader setting of the culturally significant Wellington Valley.

ii Project impacts

The project would involve earthworks and construction activities within the BESS footprint and areas of ancillary infrastructure. This would remove the upper portion of the soil profile currently present at the site.

The project area has been impacted by past activities and natural erosional processes. No cultural materials have been identified within the project area and are not expected to occur through further archaeological investigation. No intangible values for the project area have been identified to date, but the Wellington Valley Wiradjuri Aboriginal Corporation indicated increasing development in the region was having a cumulative impact on the cultural landscape; and as such identified cultural material is proposed for retention through the project, and attempts to minimise the visual intrusion of the project would be applied.

The ACHA concludes that the project is unlikely to impact Aboriginal cultural material to a traceable level through archaeological investigation. Notwithstanding there is always residual potential for unexpected finds to be uncovered during broad scale earthworks associated with project construction. As such, protocols are required in the event that unexpected Aboriginal objects are uncovered in the project area.

6.2.5 Management measures

The proposed management and mitigation measures are summarised below in Table 6.9.

Table 6.9 Aboriginal cultural heritage management and mitigation measures

Impact/risk	ID	Measure	Timing
Ground disturbance	ACHA01	All site personnel should be made aware that there are registered Aboriginal sites within the vicinity of the project area and therefore must not undertake ground disturbance outside of approved areas. Appropriate signage and temporary fencing should be erected around AHIMS 36-4-0203 to ensure no inadvertent impacts occur to this site.	Prior to ground disturbance
Impact to known heritage items	ACHA02	Appropriate signage and temporary fencing should be erected around AHIMS 36-4-0203 to ensure no inadvertent impacts occur to this site.	Pre-construction
Reporting and record keeping	ACHA03	An Aboriginal cultural heritage management plan (ACHMP) must be developed by a heritage specialist in consultation with the Aboriginal stakeholders and consent authority to provide the post-approval framework for managing Aboriginal heritage within the project area. The ACHMP should include the following aspects: • A workshop between the archaeologists and the RAPs prior to undertaking the ACHMP to develop the approach to the document as requested by Wellington Valley Wiradjuri Aboriginal Corporation during the ACHA review period. • Liaise with the RAPs in developing suitable visual strategies to minimise impacts of the project to the broader cultural landscape (eg cultural plantings, screening, paint styles, etc). • Process, timing, and communication methods for maintaining Aboriginal community consultation and participation through the remainder of the project. • Description and methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the ACHA study area that have changed following completion of the Aboriginal heritage assessment and/or during the final design and construction phases of the project. • Procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project and delivered through an Aboriginal Cultural Heritage Induction Program developed and delivered by the RAPs onsite to ensure culture, heritage and artefactual materials are identified and managed appropriately. • Procedures for the curation and long-term management of cultural materials if recovered as part of unexpected finds. • Processes for reviewing, monitoring, and updating the AHMP as the project progresses.	Pre-construction
Reporting and record keeping	ACHA04	The Construction Environment Management Plan (CEMP), or equivalent, should reinforce how the cultural landscape is considered throughout the project and detail the rehabilitation of the project area. This should be undertaken in consultation with the RAPs. The CEMP should be distributed to the RAPs for their records.	Pre-construction
Consultation	ACHA05	Consultation should be maintained with the RAPs during the finalisation of the assessment process and throughout the construction phase of the project. Details for how this consultation should be undertaken will be outlined in the ACHMP.	Pre-construction; construction
Consultation	ACHA06	A copy of the ACHA should be lodged with AHIMS and provided to each of the RAPs.	Pre-construction
Information management	ACHA07	Where the heritage consultant changes through the project, suitable hand over should occur to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management.	Pre-construction; construction

6.2.6 Conclusion

Based on the regional information and characteristics of the project footprint, it is unlikely that substantial cultural materials are present within the project area as it lacks the natural and topological features associated with long term occupation.

The ACHA concludes that the project is unlikely to impact Aboriginal cultural material to a traceable level through archaeological investigation. Notwithstanding there is always residual potential for unexpected finds to be uncovered during broad scale earthworks associated with project construction. As such, mitigation measures have been proposed for implementation in the event that unexpected Aboriginal objects are uncovered in the project area.

6.3 Noise and vibration

6.3.1 Introduction

A noise and vibration impact assessment (NVIA) was prepared by EMM in support of the EIS (refer Appendix K). The NVIA has been prepared in general accordance with the guidelines specified in:

- NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry;*
- NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy* (RNP);
- NSW Department of Environment and Conservation 2006, *Assessing Vibration: a technical guideline;*
- NSW Department of Environment Climate Change (DECC) 2009, *Interim Construction Noise Guideline* (ICNG);
- Australian and New Zealand Environment Council 1990, *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*;
- British Standard 7385 Part 2-1993 "*Evaluation and measurement for vibration in buildings Part 2*";
- British Standard 6472 – 2008, *Evaluation of human exposure to vibration in buildings* (1-80Hz); and
- German Standard DIN 4150 Part 2 1975.

The relevant SEARs and how they are addressed, are summarised in Appendix A and Section 1.1 of the NVIA (Appendix K).

6.3.2 Existing environment

i Noise and vibration assessment locations

The nearest representative noise sensitive locations to the project (hereafter referred to as 'assessment locations') have been identified for the purpose of assessing potential noise and vibration impacts. Details are provided in Table 6.10 and their locations are shown in Figure 6.6, noting R23 is a project related residence and comprises a homestead and cottage.

Table 6.10 Noise assessment locations

ID	Classification	Easting	Northing	Distance to site (m)
R1	Residential	685376	6400020	569
R2	Residential	685577	6400039	766
R3	Residential	685775	6400022	954
R4	Residential	685856	6400083	1047
R5	Residential	685806	6400364	1105
R6	Residential	685886	6400314	1153
R7	Residential	686022	6400202	1239
R8	Residential	685814	6400428	1144
R9	Residential	685945	6400399	1243
R10	Residential	686017	6400322	1277
R11	Residential	686083	6400263	1317
R12	Residential	686241	6400040	1414
R13	Residential	686372	6400138	1562
R14	Residential	686594	6399526	1624
R15	Residential	683401	6398779	1133
R16	Residential	682904	6399549	1517
R17	Residential	682836	6399514	1579
R18	Residential	682724	6399412	1681
R19	Residential	682743	6398633	1792
R20	Residential	684293	6397576	1492
R21	Residential	685614	6396806	2288
R22	Residential	686052	6396610	2615
R23 (project)	*Residential*	*685188*	*6398338*	*699*

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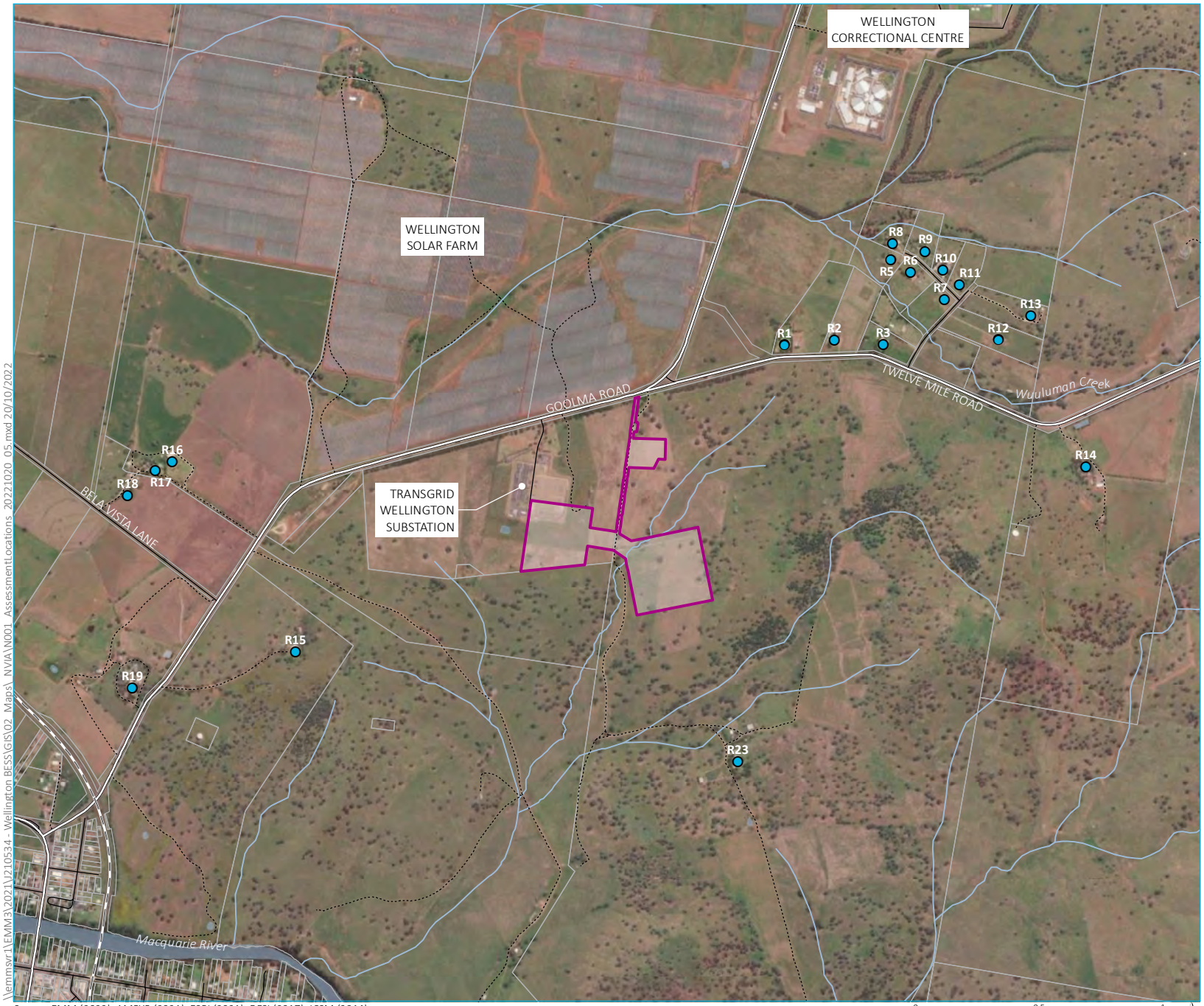
ii Background noise levels

In terms of the existing noise environment, EMM took the approach of utilising the minimum background noise thresholds of the NSW Noise Policy for Industry (NPfI) on the basis that the area land use is largely rural with limited traffic and industry. The only potential noise sources that may affect the background noise levels in the area is distant traffic on the Mitchell Highway, Goolma Road, noise from existing Wellington substation, Wellington Solar Farm and future noise from the Wellington North Solar Farm.

A review of '*Wellington Solar Farm. Construction & Operational Noise & Vibration Assessment*' (Renzo Tonin & Associates 2017) and '*Wellington North Solar Plant. Construction & Operational Noise & Vibration Assessment*' (Renzo Tonin & Associates 2018) confirmed measured background noise levels typically below the minimum thresholds of the NPfI.

Accordingly, this assessment has adopted the minimum thresholds outlined within the NPfI for the project, specifically:

- day 35 dB;
- evening 30 dB; and
- night 30 dB.



KEY

- Development boundary
- Noise assessment location
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary

Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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Noise assessment locations

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.6

EMM creating opportunities

6.3.3 Assessment criteria

i Operational noise

Operational noise associated with the project will principally be from fixed plant and equipment including battery cubicles, inverters, LV/HV transformers and HV transformers.

Noise from development in NSW is regulated by the local council, Department of Planning and Environment (DPE) and/or the EPA, and sites generally have a licence and/or development consent conditions stipulating noise limits. These limits are typically derived from project specific trigger or operational noise levels predicted at assessment locations. They are based on EPA guidelines (eg NPfI) or noise levels that can be achieved by a specific site following the application of all feasible and reasonable noise mitigation.

The objectives of noise trigger levels established in accordance with the NPfI are to protect the community from excessive intrusive noise and preserve amenity for specific land uses. It should be noted that the audibility of a noise source does not necessarily equate to disturbance at an assessment location.

To ensure these objectives are met, the EPA provides project specific noise trigger levels, namely intrusiveness and amenity.

a Intrusiveness levels

The NPfI intrusiveness noise triggers require that $L_{Aeq,15min}$ noise levels (energy average noise level over a 15-minute period) from the project do not exceed the rated background level (RBL) by more than 5 dB during the relevant operational periods. The intrusiveness noise levels are only applicable at residential assessment locations.

Table 6.11 presents the intrusiveness noise levels determined for the project based on the adopted RBLs. Where assessment locations have been grouped together in the following tables, it is expected that the ambient noise environment at these assessment locations is similar.

Table 6.11 Project intrusiveness noise levels

Residential assessment location	Assessment period[1]	Adopted RBL, dBA	Project intrusiveness noise level (RBL + 5 dB), $L_{Aeq,15min}$, dB
All residential assessment locations[2]	Day	35	40
	Evening	30	35
	Night	30	35

Notes: 1. Day: 7.00 am to 6.00 pm Monday to Saturday; 8.00 am to 6.00 pm Sundays and public holidays; evening: 6.00 pm to 10.00 pm; night: remaining periods.

2. Excluding R23 – project related residence comprising homestead and cottage.

b Amenity noise levels

The assessment of amenity is based on noise levels specific to the land use. The noise levels relate only to industrial noise and exclude road or rail traffic noise. Where the measured existing industrial noise approaches recommended amenity noise levels, it needs to be demonstrated that noise levels from new developments will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that industrial noise levels ('existing' plus the 'new' project) remain within the recommended amenity noise levels for an area, the project amenity noise level for a new industrial development is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB. It is noted that this approach is based on a receiver being impacted by multiple industrial sites (or noise sources).

Residential areas potentially affected by the project's operational noise are located to the north, east, south and west of the project. The project amenity noise levels for the identified assessment locations are presented in Table 6.12 based on a rural noise amenity area. The NpfI defines rural as an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse.

Table 6.12 Project amenity noise levels

Assessment location	Time period[1]	Indicative area	Project amenity noise level[2] dB, $L_{Aeq,period}$
All residential assessment locations[3]	Day	Rural	50 (55–5)
	Evening		40 (45–5)
	Night		35 (40–5)

Source: NpfI (EPA 2017)

1. Day: 7.00 am to 6.00 pm Monday to Saturday; 8.00 am to 6.00 pm Sundays and public holidays; evening: 6.00 pm to 10.00 pm; night: 10.00 pm to 7.00 am Monday to Saturday; 10.00 pm to 8.00 am Sundays and public holidays.
2. Project amenity noise level is Amenity noise level (Table 2.2 of NpfI) -5 dB in accordance with NpfI Section 2.4.2.
3. Excluding R23 – project related residence comprising homestead and cottage.

c Project noise trigger level

The project noise trigger level (PNTL) is the lower of the calculated intrusiveness or amenity noise levels. Taking account of the measured background noise levels, project intrusive noise levels and project amenity levels for residential assessment locations, a summary of the PNTLs for the assessment of noise from the project operations is presented in Table 6.13.

Table 6.13 Project noise trigger levels

Assessment location	Assessment period[1]	Intrusiveness noise level, $L_{Aeq,15min}$, dB	Amenity noise level[2], $L_{Aeq,15min}$, dB	PNTL[3], $L_{Aeq,15min}$, dB
R1–R22	Day	40	53	40
	Evening	35	43	35
	Night	35	38	35

Notes: 1. Day: 7.00 am to 6.00 pm Monday to Saturday; 8.00 am to 6.00 pm Sundays and public holidays; evening: 6.00 pm to 10.00 pm; 6.00 am to 7.00 am Monday to Saturday, 6.00 am to 8.00 am Sundays and public holidays; night: remaining periods.
2. Project amenity LAeq,15min noise level is the recommended amenity noise level $L_{Aeq,period}$ +3 dB as per the NPfI.
3. PNTL is the lower of the calculated intrusiveness or amenity noise levels.

d Sleep disturbance

Table 6.14 provides the sleep disturbance screening criteria for the residential assessment locations.

Table 6.14 Sleep disturbance screening criteria at residences

Assessment location	Adopted night RBL, dB	Night-time maximum noise level event screening criteria, dB	
		$L_{Aeq,15\ minute}$	L_{Amax}
R1–R22	30	40	52

ii Construction noise

The project construction NMLs for recommended standard and out of hour periods are presented in Table 6.15 for all assessment locations.

Table 6.15 Construction noise management levels – all assessment locations

Assessment location	Period	Adopted RBL[1]	NML $L_{Aeq,15min}$, dB
R1–R22	Day (standard ICNG hours)	35	45

Note: 1. The RBLs adopted from Section 6.3.2ii.

iii Construction vibration

In accordance with *Environmental Noise Management – Assessing Vibration: a technical guideline* (DEC 2006), acceptable vibration dose values (VDV) for intermittent vibration are reproduced in Table 6.16.

Table 6.16 Acceptable vibration dose values for intermittent vibration

Location	Daytime		Night-time	
	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$
Critical areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: Day time is 7.00 am to 10.00 pm and night time is 10.00 pm to 7.00 am.

These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

The BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2* recommends limits (guide values) for transient vibration to manage minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in Table 6.17.

Table 6.17 Transient vibration guide values - minimal risk of cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings.	50 mm/s	50 mm/s
Unreinforced or light framed structures. Residential or light commercial type buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

iv Road traffic noise

Construction and operational traffic require consideration for potential noise impacts. The principal guidance to assess the impact of road traffic noise on assessment locations is in the *NSW Road Noise Policy* (RNP) (EPA 2011). Table 6.18 presents the road noise assessment criteria for residential land uses (ie assessment locations). Under the definitions of the NSW RNP, Goolma will be a sub-arterial road.

Table 6.18 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria – dBA	
		Day (7.00 am to 10.00 pm)	Night (10.00 pm to 7.00 am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{eq,15hr}$ 60 (external)	$L_{eq,9hr}$ 55 (external)

Additionally, the RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to an increase of up to 2 dB.

In addition to meeting the assessment criteria in Table 6.18 any significant increase in total traffic noise at the relevant residential assessment locations must be considered. Residential assessment locations experiencing increases in total traffic noise levels above those presented in Table 6.19 should be considered for mitigation.

Table 6.19 Road traffic relative increase criteria for residential land uses

Road category	Type of project/development	Total traffic noise level increase – dBA	
		Day (7.00 am to 10.00 pm)	Night (10.00 pm to 7.00 am)
Freeway/arterial/ sub-arterial roads and transit ways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{eq(15\text{-}hr)}$+12 dB (external)	Existing traffic $L_{eq(9\text{-}hr)}$+12 dB (external)

6.3.4 Assessment methods

A detailed description of the methods and base parameters used to model construction noise and vibration and operational noise emissions from the project is provided in Chapter 5 of the NVIA (Appendix K).

6.3.5 Potential impacts

i Construction noise

In accordance with procedures outlined in Section 5.2 of the NVIA (Appendix K), prediction of construction noise levels is provided in Table 6.20 during normal day periods under noise enhancing 3 m/s wind conditions for the potential worst impact Phase 1 construction works. The construction noise level presented for each assessment location represents the energy-average noise level over a 15-minute period and assumes all plant operating concurrently.

The proponent will manage construction noise levels through construction noise management methods detailed in a construction noise management plan as discussed further in Section 6.3.6. Construction is to be during standard hours of 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday.

Table 6.20 Predicted construction noise levels – Phase 1

Assessment location	Classification	Period	Predicted construction noise level, dB $L_{Aeq,15min}$	Compliance
R1	Residential	Standard hours	51	+6
R2	Residential	Standard hours	46	+1
R3	Residential	Standard hours	46	+1
R4	Residential	Standard hours	45	Yes
R5	Residential	Standard hours	45	Yes
R6	Residential	Standard hours	45	+1
R7	Residential	Standard hours	46	+1
R8	Industrial	Standard hours	44	Yes
R9	Residential	Standard hours	44	Yes
R10	Residential	Standard hours	45	+1
R11	Residential	Standard hours	46	+1
R12	Residential	Standard hours	46	+1
R13	Residential	Standard hours	46	+2
R14	Residential	Standard hours	42	Yes
R15	Residential	Standard hours	47	+2
R16	Residential	Standard hours	45	+1
R17	Industrial	Standard hours	45	Yes
R18	Residential	Standard hours	43	Yes
R19	Residential	Standard hours	42	Yes
R20	Residential	Standard hours	45	Yes

Table 6.20 Predicted construction noise levels – Phase 1

Assessment location	Classification	Period	Predicted construction noise level, dB $L_{Aeq,15min}$	Compliance
R21	Residential	Standard hours	39	Yes
R22	Residential	Standard hours	38	Yes
R23	*Residential*	*Standard hours*	*53*	*n/a*

Excluding R23 – project related residence.

The results of the modelling demonstrate predictions of negligible (1–2 dB) exceedance for the majority of the assessment locations. A potential exceedance of 6 dB is predicted for R1 during Phase 1 works. Compliance with the ICNG NML's is anticipated for the lower noise Phase 2 and Phase 3 works at all assessment locations.

Noise modelling also considered the potential construction activities within the TransGrid Wellington Substation to accommodate an alternate location for the BESS transformers. The results of the modelling confirmed no additional adverse impacts.

Section 6.3 of the NVIA has identified further noise mitigation for R1 in the form of treatment to the dwelling through a negotiated agreement. It is recommended that the treatment to the dwelling contained in the agreement be implemented during the early stages of Phase 1 construction in order to further mitigate construction noise impacts.

Where works outside of standard hours are unavoidable, noise should be managed in accordance with the noise limits of the ICNG. Works outside of standard hours would typically require approval from the relevant regulatory authority and be justified with specialist acoustic assessment of the proposed works to be undertaken.

Predicted $L_{Aeq,15minute}$ noise contours representing the worst-case noise level footprint from the Phase 1 project construction is provided in Figure 6.7. The figure represents the predicted construction noise levels under noise enhancing conditions.

ii Construction vibration

The nearest residences (R1 and R23) are located approximately 570 m and 700 m respectively to the closest proposed construction activities. These assessment locations are beyond the safe working distances for structural damage and subject to size of vibratory roller required, likely below the levels for human response. Vibration impacts from construction at residential assessment locations are considered unlikely.

The safe working distances for cosmetic damage should be monitored throughout the construction process. Based on the safe working distances guide, if construction is within 25 m of sensitive structures, then work practices should be reviewed so that the safe working distance is followed.

If safe working distances need to be encroached, real time vibration monitoring with audible and visual alarms should be installed at vibration sensitive structures so actual vibration levels can be monitored and managed appropriately in real-time.

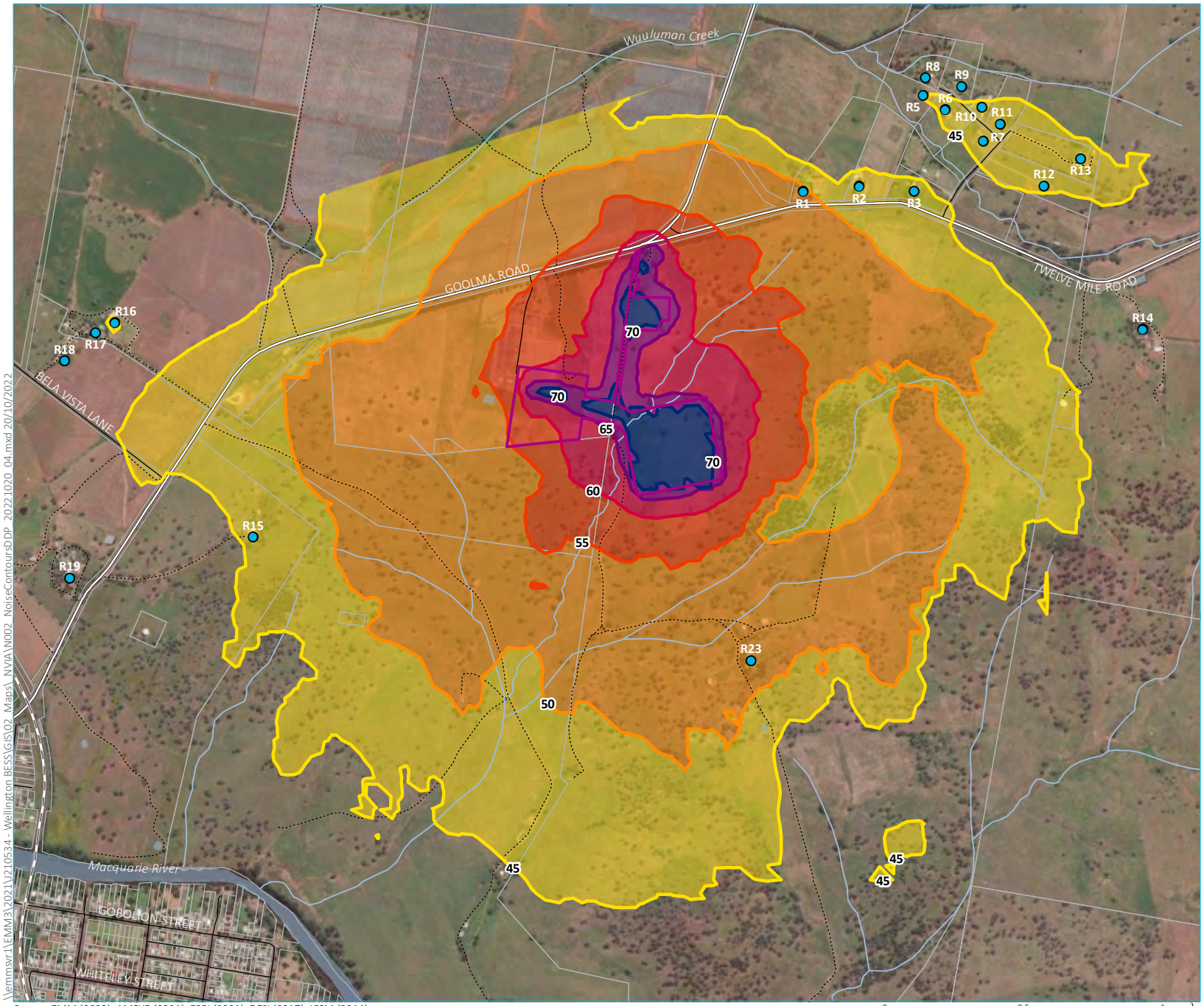
iii Road traffic noise

Road traffic noise level predictions for peak generation construction traffic are provided in Table 6.21. Traffic volumes were provided by AMPYR to represent the peak generation of light (LV) and heavy vehicles (HV) associated with the construction of the BESS facility. Construction would be restricted to standard daytime hours only.

Table 6.21 Road traffic noise calculations, Day (7.00 am to 10.00 pm)

ID	Approximate distance from nearest carriageway	Road segments	Existing movements			Existing plus project movements			Noise level increase due to the Project, $L_{Aeq,15hour}$
			Total	%HV	Calculated level, $L_{Aeq,15hour}$	Total	%HV	Predicted level, $L_{Aeq,15hour}$	
1	110 m	Goolma Road (east)	1,910	18	62.6	2,058	19	63.1	0.5
2	72 m	Goolma Road (west)	1,910	18	64.4	2,046	19	64.8	0.4

Assessment of day ($L_{Aeq,15hour}$) construction traffic predictions confirm compliance with the <2 dB increase criterion of the RNP for construction vehicles associated with the project.



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Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

Construction noise contours, day, 3 m/s wind

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.7

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iv Operational noise

a Single point predictions

Prediction of single point operational noise levels is provided in Table 6.22, for day, evening and night periods. The levels presented for each assessment location represents the energy-average noise level over a 15 minute period and assumes all plant operating concurrently under adverse meteorological conditions.

Preliminary noise modelling of the BESS operational noise levels identified the potential for exceedances at a number of residential assessment locations (**bold** text below). The assessment has therefore assumed the provision of four metre noise barriers (wall, retaining wall and mound, or acoustic mound) surrounding the BESS facility to the north, east, south and west, retaining a site access to the north-west of the BESS.

Table 6.22 Predicted operational noise levels – adverse meteorological conditions

Assessment location	Classification	Period	PNTL, dB	Predicted noise level, dB $L_{Aeq,15min}$	Satisfies NPfI Y/N (dB)
R1	Residential	Day	40	39	Y
		Evening	35	**40**	N*
		Night	35	31	Y
R2	Residential	Day	40	29	Y
		Evening	35	30	Y
		Night	35	23	Y
R3	Residential	Day	40	28	Y
		Evening	35	29	Y
		Night	35	22	Y
R4	Residential	Day	40	28	Y
		Evening	35	29	Y
		Night	35	21	Y
R5	Residential	Day	40	29	Y
		Evening	35	31	Y
		Night	35	21	Y
R6	Residential	Day	40	31	Y
		Evening	35	32	Y
		Night	35	22	Y
R7	Residential	Day	40	30	Y
		Evening	35	32	Y
		Night	35	21	Y

Table 6.22 Predicted operational noise levels – adverse meteorological conditions

Assessment location	Classification	Period	PNTL, dB	Predicted noise level, dB $L_{Aeq,15min}$	Satisfies NPfI Y/N (dB)
R8	Residential	Day	40	31	Y
		Evening	35	31	Y
		Night	35	22	Y
R9	Residential	Day	40	30	Y
		Evening	35	32	Y
		Night	35	22	Y
R10	Residential	Day	40	30	Y
		Evening	35	32	Y
		Night	35	22	Y
R11	Residential	Day	40	31	Y
		Evening	35	33	Y
		Night	35	22	Y
R12	Residential	Day	40	31	Y
		Evening	35	32	Y
		Night	35	21	Y
R13	Residential	Day	40	32	Y
		Evening	35	33	Y
		Night	35	25	Y
R14	Residential	Day	40	19	Y
		Evening	35	20	Y
		Night	35	14	Y
R15	Residential	Day	40	34	Y
		Evening	35	**36**	N (+1)
		Night	35	30	Y
R16	Residential	Day	40	31	Y
		Evening	35	33	Y
		Night	35	27	Y

Table 6.22 Predicted operational noise levels – adverse meteorological conditions

Assessment location	Classification	Period	PNTL, dB	Predicted noise level, dB $L_{Aeq,15min}$	Satisfies NPfI Y/N (dB)
R17	Residential	Day	40	31	Y
		Evening	35	32	Y
		Night	35	27	Y
R18	Residential	Day	40	29	Y
		Evening	35	31	Y
		Night	35	26	Y
R19	Residential	Day	40	29	Y
		Evening	35	31	Y
		Night	35	22	Y
R20	Residential	Day	40	32	Y
		Evening	35	34	Y
		Night	35	26	Y
R21	Residential	Day	40	23	Y
		Evening	35	25	Y
		Night	35	17	Y
R22	Residential	Day	40	23	Y
		Evening	35	25	Y
		Night	35	17	Y
R23	Residential	Day	n/a	39	n/a
		Evening	n/a	40	n/a
		Night	n/a	32	n/a

Notes: Noise mitigation options are discussed in Section 6.3.6.
Day/Evening/Night – 40%/40%/20% capacity utilisation as per design and climatic conditions.
R23 included project landholder comprising homestead and cottage and no specified noise limits to be applied.
* refer discussion below.

Noise modelling has demonstrated the NPfI noise limits are satisfied at all assessment locations during day and night operations with 40% and 20% utilisation of the Wellington BESS with the implementation of the noise mitigation proposed. Noise modelling has indicated the potential for a 5 dB exceedance at R1 and a negligible 1 dB exceedance at R15. R1 and R15 are unique assessment locations that are located on higher elevations relative to the site and effectively 'over look' the BESS.

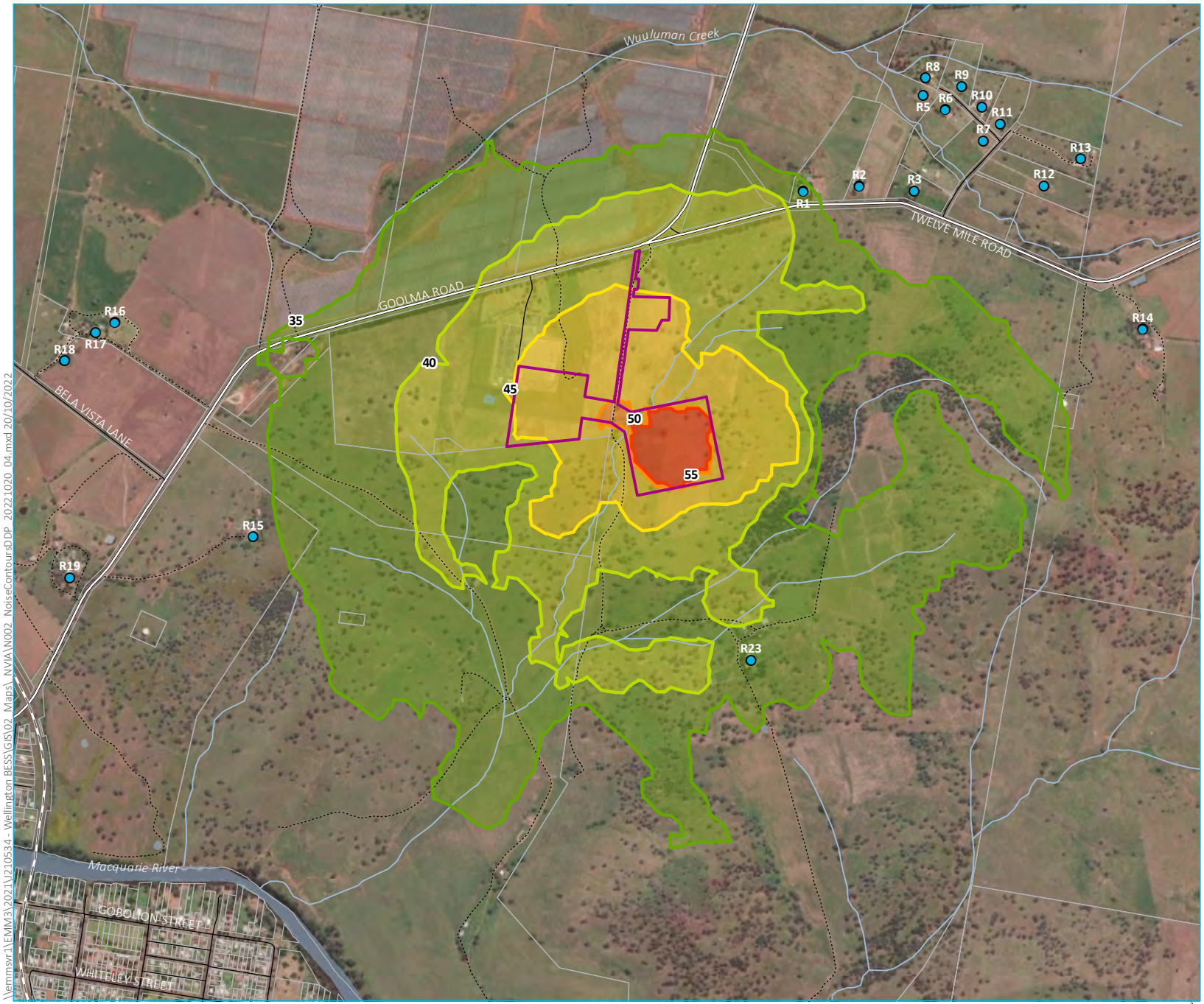
To address the residual noise exceedance at R1, negotiations have been undertaken for an agreement between the proponent and landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10 dB or more) below the relevant external PNTL. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition.

In terms of R15 and its relative height to the BESS, the proposed four metre acoustic barrier to the west of the BESS, and prediction of exceedance of 1 dB, all feasible and reasonable mitigation measures have been exhausted and no further mitigation of the residual negligible exceedance is proposed. This is consistent with the approach and requirements of the NPfI. Full compliance is predicted under 20% operational utilisation of the facility.

The operation of the BESS does not result in exceedance of the sleep disturbance screening level of L_{Aeq} 40 dB during night hours.

Noise modelling also considered the operation of the BESS transformers within the TransGrid Wellington Substation. The results of the modelling confirmed no additional adverse impacts to any assessment locations.

Predicted $L_{Aeq,15min}$ noise contours representing day, evening and night operations are provided in Figure 6.8, Figure 6.9 and Figure 6.10 respectively. The figures represent the predicted operational noise levels during noise enhancing conditions Table 6.23) for day, evening and night under the stated BESS utilisations.



KEY

- Development boundary
- Noise assessment location
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary

Noise contour - operation - day

- 35 - 40 dBA
- 40 - 45 dBA
- 45 - 50 dBA
- 50 - 55 dBA
- > 55 dBA

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Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

Operational noise contours, day, 40%, 3 m/s wind

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.8

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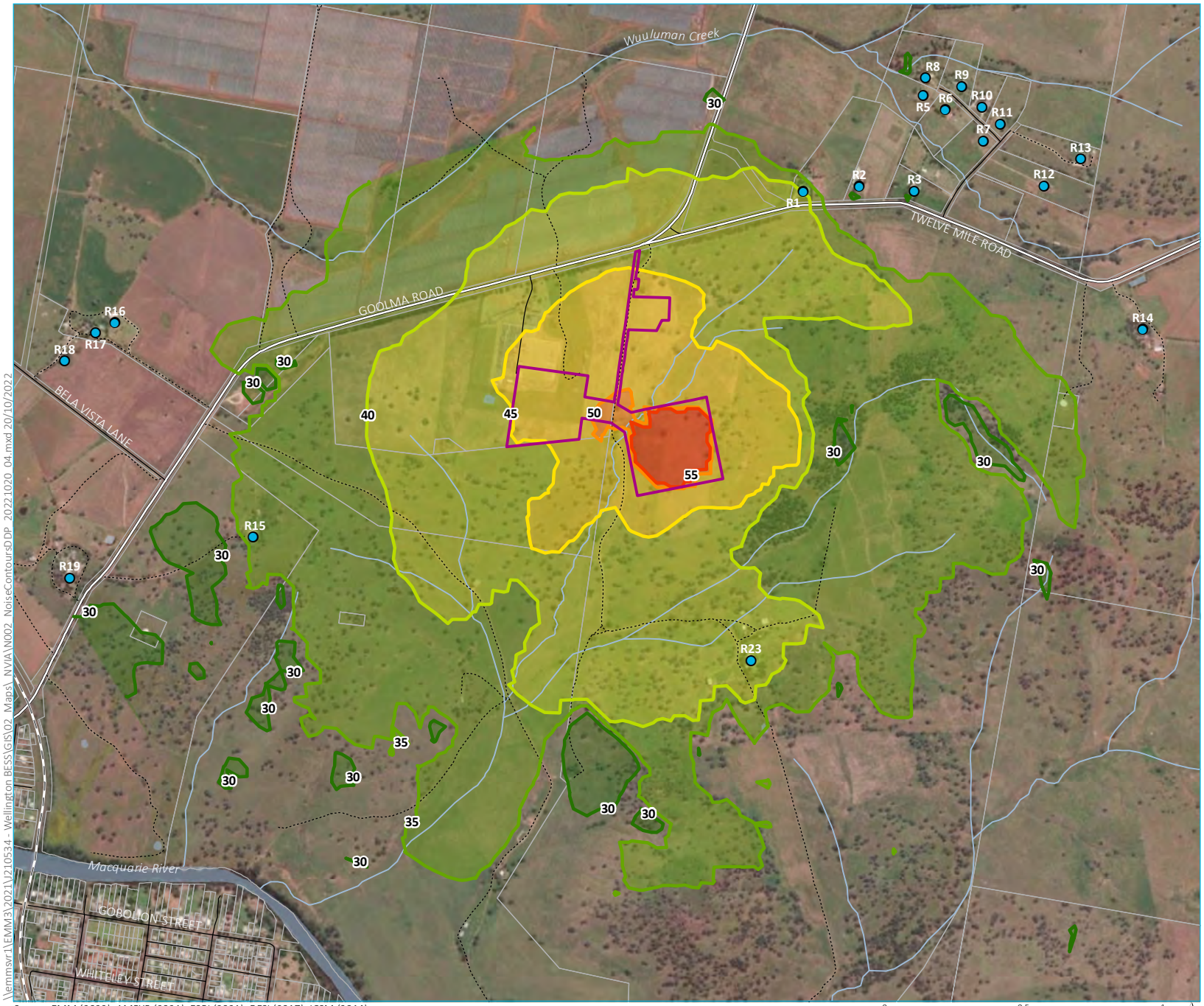

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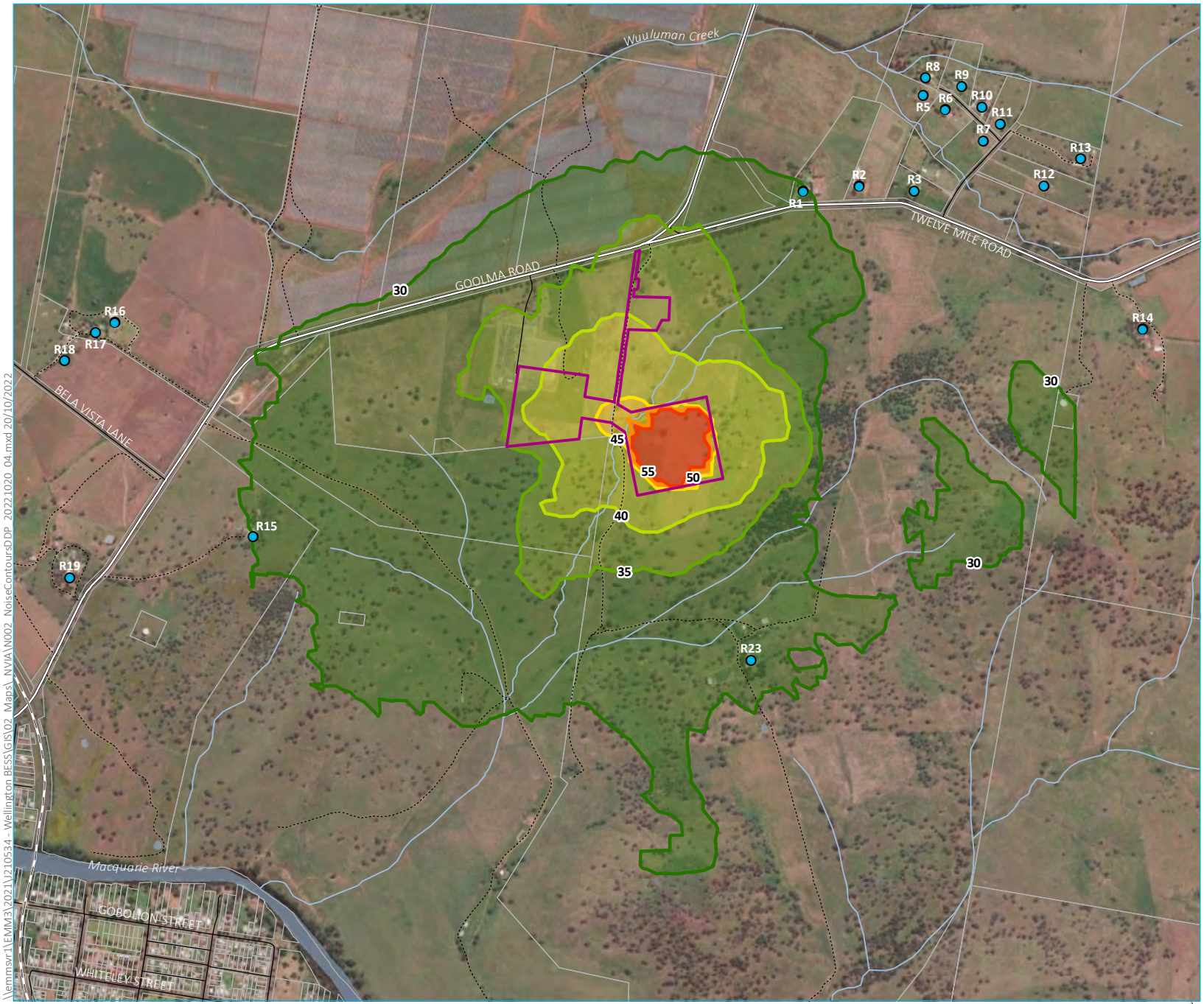
Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

Operational noise contours, evening, 40%, 3 m/s wind

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.9

EMM creating opportunities



KEY

- Development boundary
- Noise assessment location
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- Cadastral boundary

Noise contour - operation - night

- 30 - 35 dBA
- 35 - 40 dBA
- 40 - 45 dBA
- 45 - 50 dBA
- 50 - 55 dBA
- > 55 dBA

Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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Operational noise contours, night, 20%, 3°C/100 m temperature inversion

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.10

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b Cumulative operational noise impacts

The potential for cumulative noise impacts associated with the operation phase of the project and the approved and constructed Wellington Solar Farm to the north needs to be considered. The key assessment locations for the BESS facility with the potential to experience cumulative noise impacts are identified as R1–R4, R15 and R16.

EMM reviewed '*Wellington Solar Farm. Construction & Operational Noise & Vibration Assessment'* (Renzo Tonin & Associates 2017) and '*Wellington North Solar Plant. Construction & Operational Noise & Vibration Assessment*' (Renzo Tonin & Associates 2018) to determine the operational noise level contributions from the solar farm and upgraded substation in order to consider the cumulative noise levels with the BESS operation. A summary of the individual and cumulative noise levels and noise goals is provided in Table 6.23.

Table 6.23 Predicted cumulative noise levels

Assessment location	Period	Amenity noise goal*, dB	Predicted noise level, dB $L_{Aeq,15min}$			Satisfies Amenity Level Y/N (dB)
			BESS	Wellington Solar Farm and Substation	BESS, Wellington Solar Farm and Substation	
R1 (R7[1] R14[2])	Day	55	39	37	41	Y
	Evening	45	40^	37	42	Y
	Night	40	31	37	38	Y
R15 (R10[1] R12[2])	Day	55	34	34	37	Y
	Evening	45	36	34	38	Y
	Night	40	30	34	35	Y
R16 (R8[1] R13[2])	Day	55	31	34	36	Y
	Evening	45	33	34	37	Y
	Night	40	27	34	35	Y

() reference location in Tonin[1] and Tonin[2]
* Amenity noise goal for all sources (BESS and Solar Farm/Substation upgrade).

No cumulative noise impacts are anticipated as a result of the operational noise associated with the project.

6.3.6 Management measures

The EPA's NSW ICNG requires that construction noise levels are assessed against NMLs.

Construction is expected to commence in 2023. Construction noise levels above NMLs have been predicted for residential assessment locations and it is not uncommon for construction projects to exceed NMLs. For this reason, they are not considered as noise criteria, but as a trigger for all feasible and reasonable noise mitigation and management to be considered, once exceeded.

There is limited opportunity due to proximity of residential assessment locations, extent of site and local topography to provide significant noise mitigation. Management measures that could be implemented on site are provided in the following sections. It is noted that the predicted noise exceedances for construction activities are negligible 1–2 dB at a number of residential assessment locations, and 6 dB at R1.

It is noted that the predicted exceedances are under adverse conditions for the Phase 1 highest noise level works and represents a worst-case noise impact assessment. Phase 2 and Phase 3 works are anticipated to comply with the NML's.

To address the residual noise exceedance at R1, negotiations have been undertaken for an agreement between the applicant and the landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10 dB or more) below the relevant external PNTL. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition.

During the detailed design phase of the project all plant and equipment will be reviewed to ensure noise levels predicted in this NVIA can be achieved through:

- selection of plant and equipment;
- site layout and orientation of equipment;
- provision of acoustic barrier (wall/retaining wall and batter or earth mounds) four metres in height to the north, east, south and west with site access provision provided in north-west corner;
- utilisation and operational procedures consistent with the assumptions in this NVIA; or
- a combination of the above measures.

The mitigation measures proposed to be implemented area summarised in Table 6.24.

Table 6.24 Noise and vibration management and mitigation measures

Impact/risk	ID	Measure	Timing
Construction noise and vibration	NV01	Regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration amongst construction personnel.	Construction
Construction noise and vibration	NV02	Use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents will be avoided.	Construction
Construction noise and vibration	NV03	Routes for the delivery of materials and parking of vehicles to minimise noise will be developed.	Construction
Construction noise and vibration	NV04	Where possible, use of equipment that generates impulsive noise will be avoided.	Construction
Construction noise and vibration	NV05	Nearby residents will be notified prior to the commencement of intensive works.	Construction
Plant and equipment noise and vibration	NV06	Where possible, quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks will be selected.	Design and construction
Plant and equipment noise and vibration	NV07	Plant and equipment to be operated in the quietest and most efficient manner.	Design and construction
Plant and equipment noise and vibration	NV08	Plant and equipment will be regularly inspected and maintained to minimise noise and vibration level increases and to ensure that all noise and vibration reduction devices are operating effectively.	Construction and operation

Table 6.24 Noise and vibration management and mitigation measures

Impact/risk	ID	Measure	Timing
Operational noise and vibration	NV09	To address the residual noise exceedance at R1 negotiations have been undertaken between the applicant and the landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10dB or more) below the relevant external PNTL. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition. It is recommended that the treatment to the dwelling contained in the agreement be implemented during the early stages of Phase 1 construction in order to further mitigate construction noise impacts.	Construction and operation
Operational noise and vibration	NV10	During the detailed design phase of the project all plant and equipment will be reviewed to ensure noise levels predicted in the NVIA can be achieved through: • selection of plant and equipment; • site layout and orientation of equipment; • provision of acoustic barrier (wall/retaining wall and batter or earth mounds) four metres in height to the north, east, south and west with site access provision provided in north-west corner; • utilisation and operational procedures consistent with the assumptions in this NVIA; • consideration of additional earth mound to the north-east three metres in height adjacent the Twelve Mile Road site boundary; or • a combination of the above measures.	Design

6.3.7 Conclusion

Construction noise levels from the project are predicted to exceed noise management levels (NMLs) at a number of assessment locations by a negligible level (1–2 dB). An exceedance of 6 dB above NML at R1 closest to the site is predicted in the absence of specific additional mitigation. Noise monitoring during construction will be considered to determine if actual construction noise levels are above NMLs. Subject to the measured level of exceedance, availability of feasible and reasonable noise mitigation and management measures will be determined. This is discussed further in Section 7.1 of the NVIA.

The potential for vibration impacts on residents and vibration sensitive structures near construction has been assessed. The nearest residence to construction activity is assessment location R1 which is approximately 570 m away from closest construction activities. This assessment location is outside of the safe working distances of likely plant, required to maintain acceptable human response and structural vibration levels. Vibration impacts from construction at residential assessment locations are therefore highly unlikely.

With the effective management and incorporation of mitigation and management measures listed in Section 6.3.5, construction noise and vibration emissions from the project can be managed to minimise impacts.

Operational noise has been assessed under adverse weather conditions and considering the actual operational utilisation of the BESS. Noise mitigation measures have been included in the modelling following the outcome of preliminary noise modelling indicating noise exceedances. Following the implementation of all feasible and reasonable mitigation options, the modelling has demonstrated noise compliance can be achieved for all assessment locations during day and night NpfI assessment periods. During the evening assessment period the potential for a moderate exceedance of 5dB was predicted for R1 whilst a negligible 1 dB exceedance was identified for R15. All feasible and reasonable mitigation has been considered for R15, and considering the predicted level is negligible (1 dB) over the PNTL, not further mitigation is proposed.

To address the residual noise exceedance at R1, negotiations have been undertaken between the applicant and the landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10 dB or more) below the relevant external PNTL. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition.

The potential for road traffic noise impacts on public roads due to project traffic has been assessed in accordance with the NSW Road Noise Policy (RNP) for peak site traffic movements during the construction period. The assessment has confirmed that road traffic associated with the construction of the facility will not increase existing road traffic noise levels by more than 2 dB in accordance with the RNP.

With the effective management and incorporation of mitigation measures listed in Section 6.3.5 in place, noise and vibration emissions from the project can be designed to satisfy relevant guidelines, standards and policies.

6.4 Historic heritage

6.4.1 Introduction

A historic baseline assessment (HBA) was prepared by EMM in support of the EIS (refer Appendix G). The purpose of the HBA was to investigate any archaeological potential, including built heritage items of historical heritage significance related to European occupation. The HBA included a high-level desktop investigation to identify the potential historical constraints associated with the project area and a field survey to verify the results of the desktop investigation and to identify if there are any sites or items of historical significance within or near the boundary of the project area.

The HBA was prepared in general accordance with the NSW Heritage Manual. It has been prepared to address the relevant SEARs concerning historic heritage. The relevant SEARs and how they have been addressed, are summarised in Appendix A and Section 1.3 of the HBA (Appendix G).

A HBA considered a study area incorporating an area larger than the project area, including the local and broader regional area from which knowledge of the local and regional historic heritage context was gained. Through this section this is referred to as the HBA study area.

6.4.2 Existing environment

i Historical land use

The project is located within the former bounds of the private township of Montefiores. Montefiores was located just north of Wellington and was established in 1829 by Joseph Barrow Montefiores after he obtained 5,059 ha within the area.

The site of the project was granted to Joseph Barrow Montefiores and occupies Portion 10 of Parish of Nanima, County of Bligh. Originally this consisted of 1,035 ha and which made up the eastern portion of the Nanima Estate. Montefiores also owned 2,071 ha to the west and north which included the private township of Montefiores.

The Nanima Estate was subsequently sold in 1849 and was subsequently subdivided in 1893 and sold off in auction. The south-east portion of the station (Lot 10), which included the homestead and woolshed was not subdivided. The project area lies within Lot 10 and was substantially used for growing lucerne. The only structures present at the time of the auction were along the southern boundary. Historic aerial photographs from 1959 confirm that no remnant structures were present within the footprint of the project area.

ii Historical land use and disturbance

The site has been historically used for pastoral purposes and is presently occupied by two paddocks. Historical aerial photographs indicate that the project area has not undergone any large changes throughout the years and appears to have always been used as pasture or paddock without any structures present. Several farming tracks and transmission lines associated with other projects intersect the project area. A make-shift driveway generally runs along the boundary of the landholding which provides access to the private residence.

There are no registered items within the project area, however there are several items nearby as listed in Table 6.25 and illustrated in Figure 6.11.

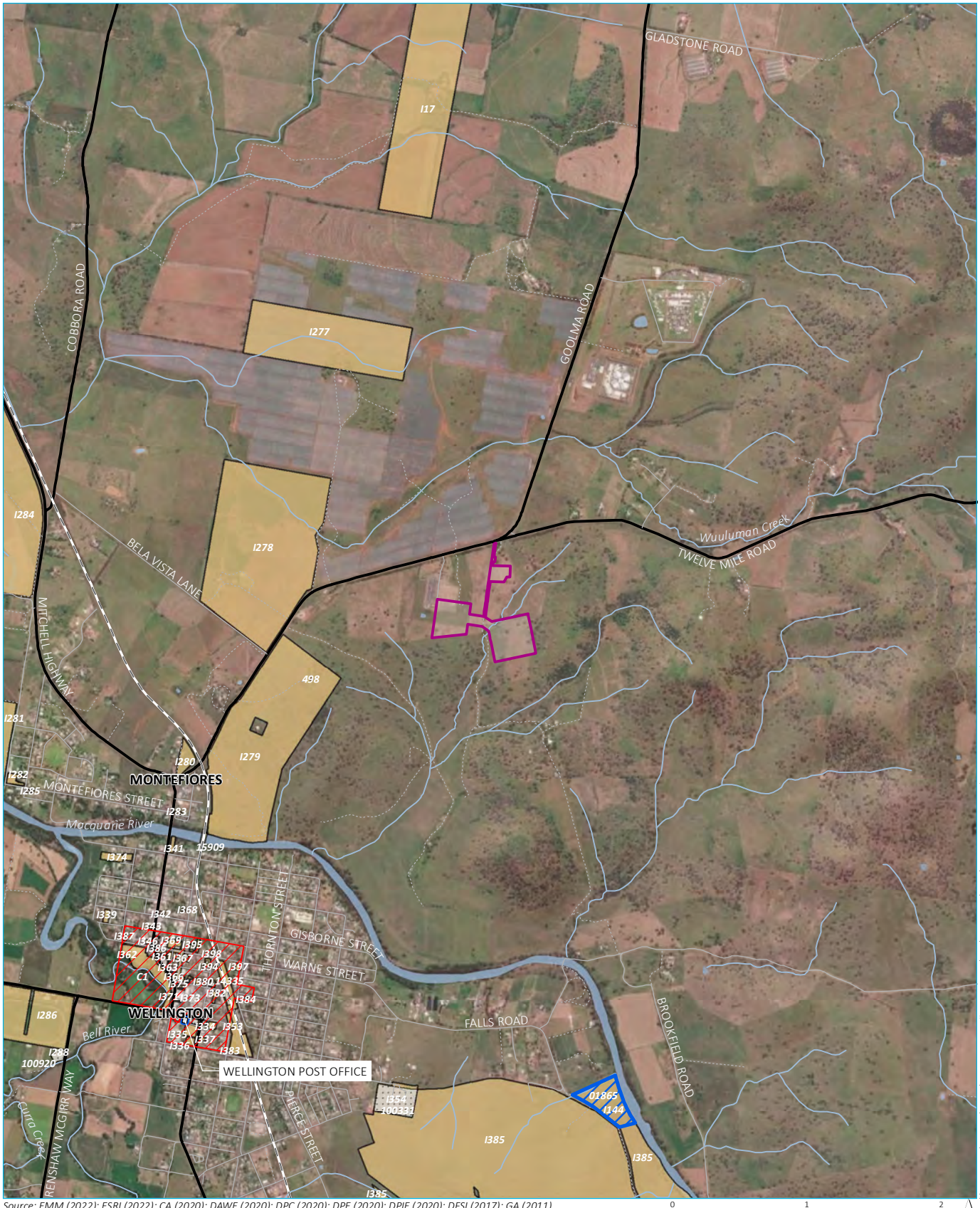
Table 6.25 Heritage items within proximity to the study area

Item name	Register	Item ID	Direction and distance to the project area
Noonee Nyrang homestead	Dubbo LEP	I11	2.6 km north
Narrawa homestead	Dubbo LEP	I49	1.4 km north
Keston homestead	Dubbo LEP	I50	1.4 km west
Nanima homestead	Dubbo LEP	I51	1 km west
Strathraye homestead	Dubbo LEP	I52	2 km west
Nanima	RNE	498	1 km west
Blacks Camp	SHR	01865	3.5 km south
Blacks Camp	Dubbo LEP	I144	3.5 km south
Wellington District Hospital (former) (Hermitage Hill)	Dubbo LEP	I112	1.3 km south-west
Old Wellington District Hospital and Surrounds	RNE	100331	1.3 km south-west

iii Site inspection

A site inspection undertaken on 26 and 27 July 2021 to understand the landscape, verify desktop results and identify if there were any sites or items of historical significance within the project area. The inspection included a pedestrian survey of the project area in 5 m transects covering the driveway from Twelve Mile Road and through two pastures to the main homestead (excluding the TransGrid lot). Both pastures were examined for any evidence of footings, wells, European plantings, or any other object which would indicate occupation; no evidence was identified. At the time of inspection, the pastures were not cropped and visibility and exposure was good. The site was noted to be littered with naturally occurring volcanic geology that had also been gathered in piles during crop season to prevent issues with farm equipment.

No evidence of occupation was identified in the project area, reinforcing the desktop assessment that all buildings were located south, closer to permanent water.



Source: EMM (2022); ESRI (2022); CA (2020); DAWE (2020); DPC (2020); DPE (2020); DPIE (2020); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody

EPBC Act

- Commonwealth Heritage List (Wellington Post Office)

Heritage Act

- State Heritage Register

LEP listings

- Conservation Area - General
- Item - General

Non-statutory listing

- Register of the National Estate

Registered historic heritage items within vicinity of the project

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Environmental impact assessment
Figure 6.11

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6.4.3 Potential impacts

The results of the HBA indicate that the risk of disturbing relics is low across the entire disturbance area. The background research and fieldwork indicated the built structures of concern in the locality were located outside the project area to the south. The pasture has been utilised for grazing and crops since the 1830s and although the landscape remains largely unchanged from that time, it does not hold any historical significance.

No potential historical archaeological impacts were identified as part of the HBA. The HBA deemed the project has low to no potential for archaeological value and the risk of disturbing relics is low.

6.4.4 Management measures

The results of the HBA and the impacts of the project indicate that the risk of disturbing relics is low, and no built heritage exists within the HBA study area. Further heritage assessment is not required. A suite of management and mitigation measures are proposed to reduce the risk of inadvertently impacting historic heritage values that have not been recorded elsewhere as summarised in Table 6.26.

Table 6.26 Historical archaeological heritage management and mitigation measures

Impact/risk	ID	Measure	Timing
Unexpected finds	HER01	If unexpected finds of historical nature are discovered during any work, work within 5 m of the find must cease and the following steps taken: • an archaeologist will be contacted to assess the find, where relevant, and determine if it is clearly a relic or has moderate to high potential to be a relic (this may require additional research); • if the find is determined to be a relic, a s146 (of the Heritage Act) is to be forwarded to the Heritage Council who will be consulted on the appropriate management measure; and • if the find is assessed and is not a relic, work inside the area that was made a no-go area can re-commence.	Construction and operation
Human remains	HER02	In the event that known or suspected human remains (generally in skeletal form) are encountered during the activity, the following procedure will be followed immediately upon discovery: • all work in the immediate vicinity will cease and the find will be immediately reported to the work supervisor who will advise the Environment Manager or other nominated senior staff member; • the Environment Manager or other nominated senior staff member will promptly notify the police (as required for all human remains discoveries); • the Environment Manager or other nominated senior staff member will contact Heritage NSW for advice on identification of the human remains; • if it is determined that the human remains are Aboriginal ancestral remains, the Local Aboriginal Land Council will be contacted, and consultative arrangements will be made to discuss ongoing care of the remains; and • if it is determined that the human remains are not Aboriginal ancestral remains, further investigation will be conducted to determine if the remains represent a historical grave or if police involvement is required.	Construction and operation

6.5 Hazard and risk

6.5.1 Introduction

A preliminary hazard analysis (PHA) was prepared by Sherpa Consulting (refer Appendix N). It summarises potential hazards and risks associated with the project and details measures which, when implemented, will reduce these hazards and risks to acceptable levels. The scope of the PHA considered the proposed infrastructure associated with the project including battery enclosures and electrical conversion systems (eg inverters and transformers), the on-site substation, transmission line connection infrastructure, upgrades of the existing Wellington substation and ancillary infrastructure.

i Assessment guidelines and requirements

The relevant requirements of the SEARs and how they are addressed, are summarised in Appendix A. In accordance with the SEARs, the PHA has been prepared in accordance with the following guidelines:

- Hazardous Industry Planning Advisory Paper No 6 – *Guidelines for Hazard Analysis* (DoP 2011a) (HIPAP 6);
- *Assessment Guideline – Multi-level Risk Assessment* (DoP 2011b) (Multi-level Risk Assessment Guideline);
- Hazardous Industry Planning Advisory Paper No 4 – *Risk Criteria for Land Use Safety Planning* (DoP 2011c) (HIPAP 4); and
- the *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* (International Commission on Non-Ionizing Radiation Projection (ICNIRP) 2010).

ii Potentially offensive development

Potentially offensive industry is where in the absence of safeguards and controls, the project could 'emit a polluting discharge that could cause a significant level of offence'. Examples of this may include depositional dust, or operational noise impacts on adjacent residents or land uses.

The *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (DoP, 2011) (Hazardous and Offensive Development Guideline) describe how to assess if a proposal is potentially hazardous or offensive. The Hazardous and Offensive Development Guideline states that a proposal is potentially offensive if it requires pollution licencing from the EPA. Granting of a license by the EPA is sufficient to demonstrate that emissions can be effectively managed and, therefore, a proposal is unlikely to be offensive. However, the project is not a 'scheduled activity' under the POEO Act and an EPL is not required.

Notwithstanding the above, the project may emit pollutants which in the absence of safeguards could cause offense. However, management measures will be implemented to ensure that that emissions will not exceed relevant criteria. Therefore, the project is unlikely to qualify as offensive development under the Resilience and Hazards SEPP.

iii Potentially hazardous development

A PHA is required if the screening process described in the Hazardous and Offensive Development Guideline indicates the proposal is potentially hazardous. A 'hazardous industry' under the Resilience and Hazards SEPP is one which, when all locational, technical, operational and organisational safeguards are employed, continues to pose a significant risk. As described in this section, there is potential for fire to arise during operation of the project due to the ignition of flammable material, resulting in injury or destruction of property. Measures will be implemented with regard to fire risk and hazardous substance storage and handling.

iv Summary of assessment methods

The PHA involved the following steps:

1. Establishment of the study context.
2. Identification of hazards resulting from the operations of the BESS and events with the potential for offsite impact (hazard identification).
3. Analysis of the severity of the consequences for the identified events with offsite impact, eg fires and explosions (consequence analysis).
4. Determination of the level of analysis and risk assessment criteria.
5. Analysis of the risk of the identified events with offsite impact (risk analysis).
6. Assessment of the estimated risks from identified events against risk criteria to determine acceptability (risk assessment).

6.5.2 Existing environment

In operation, the project will occupy an area of approximately 13 ha within a rural landholding currently occupied by vacant paddocks. The project will be developed in close proximity to, and incorporate upgrade of, the Wellington Substation. Transmission lines transect the rural landholding to the immediate north of the proposed development boundary and the Wellington South Solar Farm is located to the north of the site, opposite Goolma Road. Other rural residential land uses are located at distance. From the operational areas associated with the project (the BESS compound, substation and transmission line), the landowner residence is located approximately 700 m away and the closest non project-related residence is located approximately 800 m to the north.

6.5.3 Potential impacts

Potential hazards associated with operation of the project were identified through a hazard identification process involving a review of controls detailed in the brochures, product specification and fire safety design documents for prospective technology providers. Further, a literature review of past incidents involving similar BESS systems and previous risk assessments for similar BESS systems completed by Sherpa was undertaken, along with consultation with AMPYR.

The assessment identified numerous scenarios/events with potential for offsite impacts, which were subject to qualitative risk analysis in accordance with the Multi-level Risk Assessment Guideline, the results of which are presented in Table 6.27.

Table 6.27 Qualitative risk assessment results

Hazard	Event	Consequence	Offsite consequence	Significant offsite impact?	Risk analysis (offsite and public impact)		
					Severity	Likelihood	Risk
Electrical	Exposure to voltage	• Electrocution. • Fire. • Injury and/or fatality to onsite employees. • Injury and/or fatality to member of public due to touch and step potential.	No offsite impact expected as the BESS will be situated in a rural area and there is a large separation distance to the nearest residential dwelling(s).	No	Insignificant	Unlikely	Very Low
Energy	Arc flash	• Arc blasts and resulting heat, may result in fires and pressure waves. • Burns. • Exposure to intense light and noise. • Injury and/or fatality to onsite employees.	Localised effects, the effects are not expected to have an offsite impact.	No	Insignificant	Rare	Very Low
Fire	BESS fire	• Release of toxic and/or explosive combustion products. • Escalation to the entire BESS. • Injury and/or fatality to onsite employees.	No offsite impact expected due to provision of fire protection/suppression system for the BESS. The BESS will also be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
	Substation fire	• Release of toxic combustion products. • Escalation to adjacent infrastructure. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest dwelling.	No	Insignificant	Unlikely	Very Low
	Bushfire	• Escalation to adjacent infrastructure. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest dwelling(s), including presence of an Asset Protection Zone.	No	Insignificant	Unlikely	Very Low

Table 6.27 Qualitative risk assessment results

Hazard	Event	Consequence	Offsite consequence	Significant offsite impact?	Risk analysis (offsite and public impact)		
					Severity	Likelihood	Risk
Chemical	Release of battery electrolyte (liquid/vented gas) from the battery cell	• Release of flammable liquid electrolyte. • Vapourisation of liquid electrolyte. • Release of vented gas from cells. • Fire and/or explosion in battery enclosure. • Release of toxic combustion products. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
	BESS chiller unit or coolant leak	• Irritation/injury to onsite employee on exposure to leak. • Ingress of coolant to battery or other electrical components (battery enclosure) leading to short circuit and fire, resulting in injury and/or fatality to onsite employees.	No offsite impact expected as the BESS will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
	Refrigerant leak (Tesla Battery System)	• Irritation/injury to on-site employees on exposure (skin contact).	Localised effects – not expected to have an off-site impact.	No	Insignificant	Unlikely	Very Low
Explosive Gas	Generation of explosive gas	• Fire and/or explosion in battery enclosure. • Release of toxic combustion products. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
Reaction	Thermal runaway in battery	• Fire in the battery cell and enclosure. • Escalation to the entire BESS. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low

Table 6.27 Qualitative risk assessment results

Hazard	Event	Consequence	Offsite consequence	Significant offsite impact?	Risk analysis (offsite and public impact)		
					Severity	Likelihood	Risk
EMF	Exposure to electric and magnetic fields	• High level exposure (ie exceeding the reference limits) may affect function of the nervous system (ie direct stimulation of nerve and muscle tissue and the induction of retinal phosphenes). • Injury to onsite employees.	No offsite impact expected as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
External factors	Water ingress (eg rain, flood)	• Electrical fault/short circuit. • Fire. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low
	Vandalism due to unauthorised personnel access and deliberate damage to project infrastructure	• Asset damage and potential hazard to unauthorised person (eg electrocution).	Effects to an unauthorised person is expected to be localised and not expected to have an offsite impact. The impact is to a member of public but occurs onsite. For a fire event, the effects are not expected to have an offsite impact as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest residential dwelling(s).	No	Major	Unlikely	Medium
	Lightning strike	• Fire. • Injury and/or fatality to onsite employees.	No offsite impact expected as the BESS and substation will be situated in a rural area and there is a large separation distance to the nearest dwelling(s).	No	Insignificant	Unlikely	Very Low

i Assessment against risk acceptance criteria

Using the study risk matrix referenced from AS/NZS 5139, the identified hazardous events were qualitatively risk profiled. Of the 14 events identified, all were rated as “Very Low” risks except for one “Medium” risk event. This event is related to unauthorised person access to the proposed BESS/development area, resulting in vandalism/asset damage to the infrastructure with the potential for self-injury during the act. The PHA noted that the controls for this event are well understood and will be implemented accordingly. In addition to the rural location of the site, the project infrastructure will be located within a secure area with fencing and cameras, and warning signs will be provided. Mitigation measures would also include onsite security protocol and presence of staff during operational hours. In combination, these prevention and mitigation measures are expected to significantly reduce the likelihood of this event. The likelihood rating for this event was rated as “Unlikely”.

All identified events are not expected to have significant offsite impacts. Based on the study risk acceptance criteria, the risk profile for the project is considered to be tolerable.

The analysis finds that the project is compliant with the HIPAP 4 qualitative risk criteria, in particular:

- the proposed location is suited for the project, it is situated in rural area with considerable separation distance to nearby sensitive receptors and will therefore avoid off-site risks;
- based on the separation distance to sensitive receptors, consequence impacts from the identified hazardous events are not expected to have significant off-site impacts;
- for all events the impacts are expected to be localised and contained within the boundaries of the installation with no significant off-site impacts; and
- there is no other additional hazardous development in the vicinity.

6.5.4 Management measures

The PHA has made a suite of recommendations to ensure that risks are minimised and continue to be localised as summarised in Table 6.28.

Table 6.28 Hazards management and mitigation measures

Impact/risk	ID	Measure	Timing
Offsite safety incidents	HAZ01	AMPYR to consult with Fire and Rescue NSW (FRNSW) during detailed design of the facility to ensure that the relevant aspects of fire protection measures have been included. These may include: 1. type of firefighting or control medium; and 2. demand, storage and containment measures for the medium. The above aspects will form an input to the Fire Safety Study which may be required as part of the development consent conditions, for review and approval by FRNSW.	Design
Offsite safety incidents	HAZ02	AMPYR to review the investigation reports on the Victorian Big Battery Fire (occurred on 31 July 2021) and implement relevant findings for the project. The publicly available investigation reports include: • Energy Safe Victoria: *Statement of Technical Findings on fire at the Victorian Big Battery.* • Fisher Engineering and Energy Safety Response Group: *Report of Technical Findings on Victorian Big Battery Fire.*	Design

6.6 Land resources

6.6.1 Introduction

A land, soils and erosion assessment (LSEA) was prepared by EMM to identify and assess potential land capability, soil erosion, sedimentation and rehabilitation impacts associated with project construction and operation (refer Appendix H). It also provides an assessment of the project on the agricultural resources of the site and on agricultural production.

The SEARs require an assessment of the potential impacts of the development on existing and approved land uses on the site and adjacent land a soil survey to determine the soil characteristics and consider the potential for erosion to occur. The relevant SEARs and how they are addressed, are summarised in Appendix A and Section 1.3 of the LSEA (Appendix H).

6.6.2 Existing environment

i Soils

State-wide Australian Soil Classification (ASC) mapping (DPIE 2021g) identifies that the site encompasses one soil order, Ferrosols (Figure 6.12). A description of this soil type is provided in Table 6.29.

Table 6.29 Summary of regional ASC soil mapping

Soil Type	ASC description	Agricultural potential
Ferrosols (FE)	• Soils with B2 horizons that are high in free iron oxide and lacking a strong texture contrast between the A and B horizons. • Soils other than Vertosols, Hydrosols and Calcarosols that: – have B2 horizons in which the major part has a free iron oxide content greater than 5% Fe in the fine earth fraction (<2 mm); and – do not have a clear or abrupt textural B horizon or a B2 horizon in which at least 0.3 m has vertic properties.	• Generally high agricultural potential. • Good structure and moderate to high chemical fertility and water holding capacity. • High rainfall equivalents may suffer from acidification and nutrient leaching. • May be subject to structural decline after repeated cultivation.

The ASC soil mapping correlates with the Euchrozems (E) great soil group and includes the Bodangora (bz) and Nanima (na) soil landscapes. The project area is predominantly located on the Nanima soil landscape with areas of the Bodangora soil landscape associated to the north and south of project area. The erosion hazards discussed for both soil landscapes highlight:

- soils are slightly to moderately erodible, but slopes are steep (3%–20%) and long (300–3000 m);
- erosion hazard is high when surface cover is low, especially under cropping;
- important that soil conservation earthworks or farming practices are utilised to control erosion; and
- severe erosion has occurred in the past.

The fertility of both soil landscapes soil types is noted as moderate with N and P required with continued land use and good physical structure with some susceptibility to hardsetting.

Inherent soil fertility is used as a general indication of a soil's capacity to retain and release nutrients and soil water for use by vegetation and is a function of the interrelationship between physical, chemical and biological components in the soil. Ferrosols are classified as having a variable inherent soil fertility of 'moderately high'. Soils of this classification have high fertility in their virgin state but this fertility is significantly reduced after only a few years of cultivation.

Land and soil capability (LSC) describes the inherent physical capacity of the land to sustain a range of land uses (and management practices) in the long term without leading to degradation of soil, land, air and water resources. The project area is identified as Class 3 (High capability land) and Class 6 (Low capability land) (refer Figure 6.13).

There are no acid sulfate soils or potential acid sulphate soils in the project area. The project area is at low risk from acid sulfate soils.

ii Soil chemistry

During a site inspection (21 December 2021), opportunistic sampling of soils was undertaken at five sites from across the study area (refer Figure 6.12) to determine soil characteristics and the potential for erosion to occur. Soil samples were tested at a National Association of Testing Authorities (NATA) accredited laboratory. Detailed laboratory results and reports are provided in Appendix A and Appendix B of the LSEA (Appendix H).

The soil chemistry across the site is generally consistent in soil pH and salinity. Topsoil fertilities are generally moderate but have varying deficiencies between the two soil groups described. Some soils (represented by site 2 and 3) present within the project area likely have dispersive characteristics that would present an erosion risk.

iii Erosion hazard

The erosion potential of a soil is determined by its physical and chemical properties and is expressed as its K-Factor (t.ha.h). Table 6.30 provides a soil erodibility ranking for K-Factor from Rosewell (1993).

Table 6.30 Rosewell (1993) soil erosion ranking

K-Factor (t ha h $ha^{-1}MJ^{-1}mm^{-1}$)	Erosion potential
<0.02	Low
>0.02 to <0.04	Moderate
>0.04	High

The modelled K-Factors for the project area were determined from the eSpade 2.1 database. The modelled K-Factors range from 0.03–0.05 t ha h $ha^{-1}MJ^{-1}mm^{-1}$, which indicate that the project topsoils have a moderate to high erosion potential.

Site specific soil testing show subsoils in the vicinity of the laydown area to be strongly sodic and the remainder of the subsoils to be magnesic and therefore have potential to disperse. Landcom (2004) recommends increasing the K-Factor for dispersive soils by 10%. A K-Factor of 0.071 t ha h $ha^{-1}MJ^{-1}mm^{-1}$ has been adopted to determine the erosion hazard of project subsoils.

Slope of land and the Rainfall Erosivity (R-Factor) has been considered to determine erosion hazard. The battery storage facility has an average slope of 5% and the laydown area 12.5%. The calculated R-Factor for the project is 1,310 MJmmha-1h-1. Applying these parameters to the erosion hazard nomograph results in a low erosion hazard due to slope and rainfall erosivity. Any slopes greater than 15% will have a high erosion hazard.

Annual average erosion due to sheet and rill erosion in t/ha/y modelling was completed using the Revised Universal Soil Loss is calculated in Table 6.31.

Table 6.31 Modelled annual average soil erosion

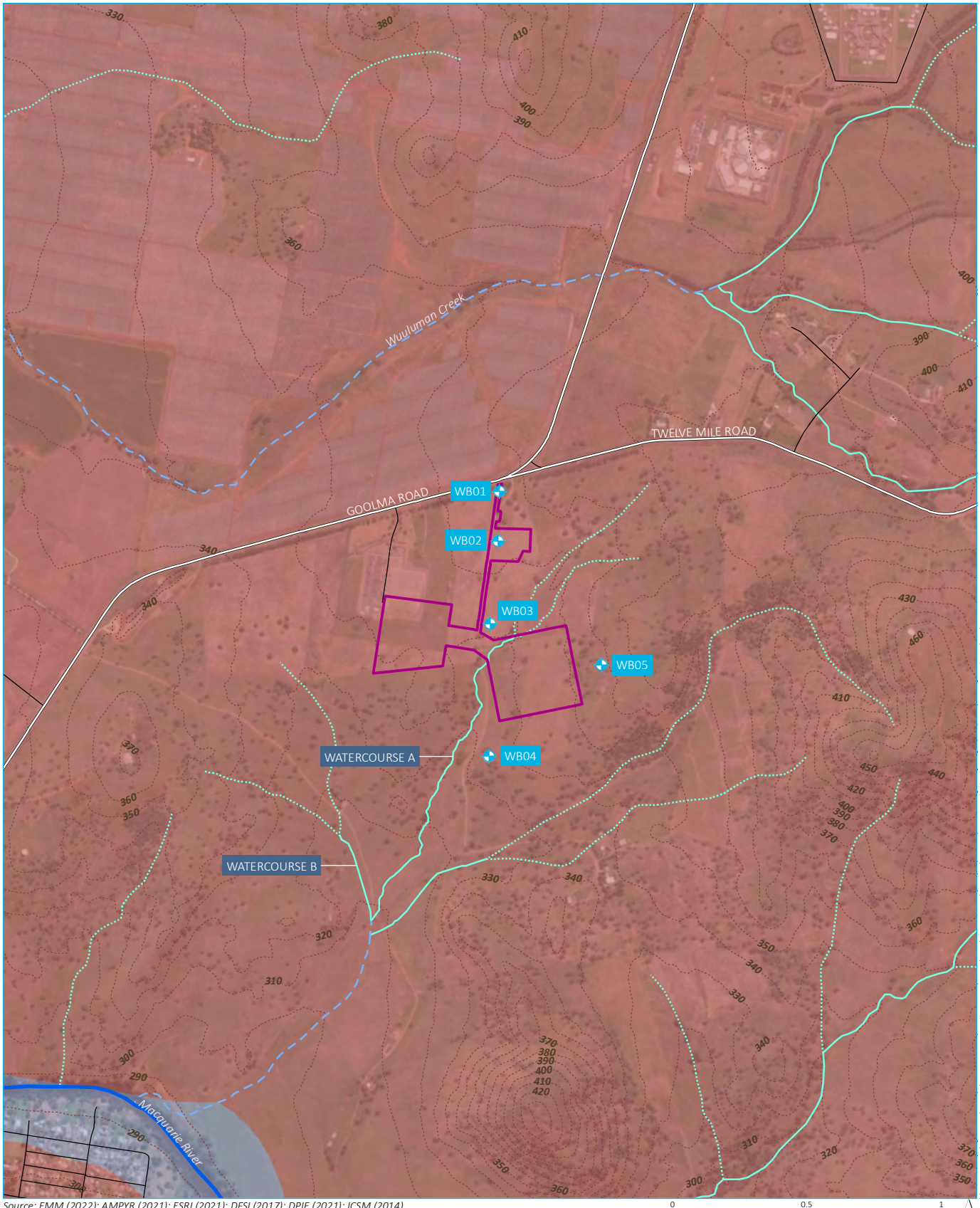
Parameter	Substation/BESS	Laydown area	TransGrid substation upgrade works area
Rainfall Erosivity (R-Factor)	1,310 MJmmha^{-1}h^{-1}	1,310 MJmmha^{-1}h^{-1}	1,310 MJmmha^{-1}h^{-1}
Soil erodibility (K-Factor)	0.071 t ha h ha^{-1}MJ^{-1}mm^{-1}	0.071 t ha h ha^{-1}MJ^{-1}mm^{-1}	0.071 t ha h ha^{-1}MJ^{-1}mm^{-1}
Length/slope (LS-Factor) (Landcom 2004)	2.53	1.26	1.82
Area	9.27 ha[1]	1.50 ha	6.54 ha[2]
Conservation practice (P-Factor) Landcom 2004)	1.3	1.3	1.3
Cover (C-Factor) Landcom 2004)	1	1	1
Annual average soil loss (t/ha/y)	**2,835.8**	**228.5**	**1,439.2**
Annual average soil loss for area (t/y)	**305.9**	**152.4**	**220.1**

1. Includes area of substation, BESS, indicative asset protection zone and indicative landscaping.
2. Includes area of TransGrid substation upgrade works area and indicative easement.

The total disturbance area and modelled annual average soil loss trigger the need for a sediment basin for the substation/BESS, TransGrid substation upgrade works area and laydown area. The laydown area only just achieves an average soil loss greater than 150 t/y which could be potentially reduced by using temporary stabilising measures such as trafficable soil stabilising polymers or the use of gravelled hardstand to reduce soil loss below the threshold of 150 t/y.

iv Biophysical Strategic Agricultural Land

There is a minor area (~0.9 ha) of BSAL mapped within the disturbance area associated with the project (Figure 6.13). This area will comprise a section of the site access track that connects with Goolma Road, the washdown bay, and a portion of the temporary construction laydown area. It should be noted that the portion of BSAL to be impacted by the project is already impacted by the existing access track, therefore project activities are not expected to impact this area significantly. There is significant BSAL mapped north of the site (opposite Goolma Road and Twelve Mile Road) and there are also areas mapped as BSAL within the landholding to the east and south that will not be impacted by the project.



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); DPIE (2021); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Soil sampling location
- Major road
- Minor road
- Topographic contour (10 m)

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 9th order

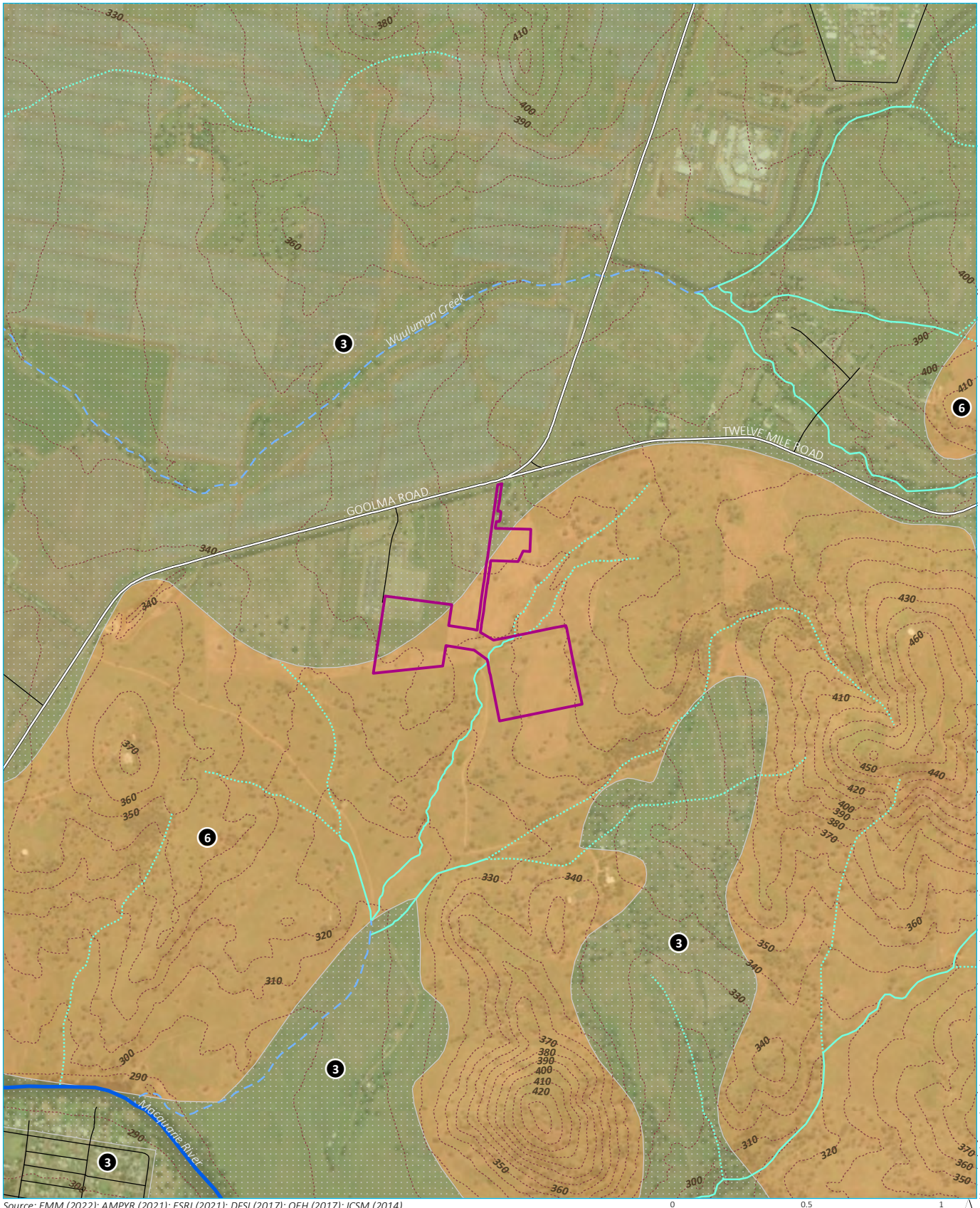
Australian soil classification

- Dermosols
- Ferrosols

ASC mapping

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.12

EMM creating opportunities



Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); OEH (2017); ICSM (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Development boundary
- Major road
- Minor road
- Topographic contour (10 m)

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 9th order

Biophysical Strategic Agricultural Land

Land and soil capability

- 3 | Moderate limitations
- 6 | Very severe limitations

Modelled land and soil capability and BSAL mapping

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.13

EMM creating opportunities

6.6.3 Potential impacts

i Land and soil capability

The project has the potential to result in impacts to LSC during construction and operation. Key project risks are summarised in this section.

a Construction

During construction, the project has the potential for the following impacts:

- reduction in soil stability and increased susceptibility to erosion due to vegetation removal or soil exposure, especially as the subsoil is sodic and dispersive in areas;
- erosion of soil due to exposing soils, disturbing dispersive subsoils and concentration of flow;
- loss of structure and water holding capacity due to mechanical compaction;
- loss or degradation of topsoil material viable for use in rehabilitation;
- introduction of salinity or sodicity into the topsoil material if soil is inadequately managed;
- risk of exposing buried contaminants (pesticides and hydrocarbons); and
- introduction of contaminants into soil material (eg hydrocarbons from plant).

Soil mixing

Impacts on soils and land soil class are typically a function of topsoil loss or degradation during construction and/or soil inversion due to poor soil management. Topsoil has the highest biological activity, organic matter, and plant nutrients which are all key components of a productive soil. The potential loss of this upper layer of soil impacts the ability of the soil to provide nutrients, regulate water flow, and resist pests and disease.

Inappropriate soil handling (eg inappropriate separation of topsoil and subsoils during striping and stockpiling and mixing of the soil profile) practices is a key risk for land and soil capability.

Loss of nutrients and nutrient holding capacity, results in a less fertile environment for crop and pasture production. The organic matter and finer soil particles, primarily clays, responsible for soil fertility can be readily eroded when exposed leaving larger, less reactive particles such as sand and gravel.

Compaction

Topsoil degradation can result in organic matter reduction which can lead to soil density increases and subsequent compaction. Compaction lowers the infiltration rate of water into the soil profile and reduces the plant available water holding capacity. Compaction also reduces gaseous exchange.

Construction equipment, such as plant movement, can also compact the soil resulting in reduced water holding capacity, increased runoff and therefore erosion potential and reduced plant root and shoot penetration.

b Operation

Impacts to soils during operation are expected to be minimal however legacy issues from inappropriate design and construction could include:

- erosion of soil resources to excessive concentration of flow and inappropriate channel lining and flow energy dissipation;
- tunnel erosion in cable trenches due to inadequately compacted and ameliorated dispersive subsoils; and
- exposure of dispersive soils in cut and fill batters and excavations.

Lands subject to permanent infrastructure will not be able to be used for cropping or cattle grazing once constructed. The lands are currently used for cattle grazing.

The land will not be available for agriculture during the life of the project. However, the LSC status of lands subject to infrastructure with a small footprint or temporary disturbances will be able to be maintained or reinstated following appropriate landform design and rehabilitation.

It is expected the LSC status of most of the project disturbances will be able to be re-established if the recommended management and mitigation measures are implemented (refer Section 6.6.4).

ii Agricultural productivity

The project area is primarily classed under the Australian Collaborative Land Use Mapping (ALUM) Program as ALUM 3.2.0 grazing modified pastures (14.99 ha). There are also minor areas of ALUM 2.1.0, grazing native vegetation (0.0002 ha), and ALUM 5.6.5, Electricity substations and transmission (4.36 ha).

Indicative $/ha values for selected commodities have been determined via Australian Bureau of Agricultural and Resource Economics and Sciences. In Dubbo Regional LGA livestock grazing comprises production value of up to $46.08 million and occupies 395.906 ha in the catchment. Accordingly, the relevant $/ha value for the site is $116.39. The project will encompass some 14.99 ha of land in the project area used for grazing. Were this land to be developed (change of use) it would be valued between $1,894.59 in annual productivity based on estimated agricultural values for the Dubbo Regional LGA.

Given the small disturbance area this is not a significant loss of agricultural land value based on annual productivity. Once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and the project area returned to its pre-existing land use, namely suitable for grazing of sheep and cattle, or another land use as agreed by the project owner and the landholder at that time. Project impacts are anticipated to be limited primarily to the direct project area with minimal impact to adjacent lands.

6.6.4 Management measures

The LSEA details a range of drainage, erosion and sediment control management strategies to address the identified impacts to LSC and erosion and sedimentation impacts as summarised in Table 6.32.

Table 6.32 Land resource management and mitigation measures

Impact/risk	ID	Measure	Timing
Impacts to land and soil capability	LR01	As part of the CEMP, soil management measures are recommended to ensure the preservation of soil resources, including: • assessment of topsoil depths to be stripped prior to stripping to minimise the mixing of topsoil and subsoil; • attempt to strip and manage different soils types separately; • avoid mixing topsoil with subsoil during stripping operations; • avoid stripping topsoil following heavy rain periods that leaves the soil structure saturated; • avoid compaction of topsoil during stripping and stockpiling operations; • amelioration of topsoil and, where necessary, subsoil during stripping operations in accordance with a soil scientists' recommendations. Ameliorants should be applied prior to stripping of their respective layers, to maximise mixing of the ameliorants during the stripping process; • stockpile topsoil separately from subsoil (if it is necessary to strip subsoil); • where practical and possible, the subsoils and topsoils should be located so that stockpiled material is placed on the same underlying soil unit; • protection of stockpiles from erosion using soil stabilising polymers, cover crops or other forms of stabilisation; • revegetation of long-term topsoil stockpiles with native plant community types to minimise stockpile water logging, the generation of anaerobic conditions, help maintain topsoil biological viability and to create a seed store; and • test stockpiled subsoil and topsoil to determine amelioration requirements prior to reinstatement.	Design
Erosion and sedimentation	LR02	Drainage and landform design to: • avoid concentration of flow and maintain sheet flow conditions where practicable; • avoid excavating drains in dispersive soils and locate roads, hardstands and pads to utilise the natural slope so that water drains away as required; • maintain the velocity of flows below 0.3 m/s; • avoid the use of structures that pond water and can cause tunnel erosion such as check dams and channel banks in concentrated flows and benches on cut and fill batters; • use back-push diversion in lieu of channel banks if it is necessary to divert flow; • ameliorate dispersive soils particularly in cable trenches and fill embankments where there is a high risk of tunnel erosion; and • use high efficiency sediment basins (Type B) with flow activated dosing systems to treat turbid runoff to protect downstream receivers.	Design
Land disturbance extent and duration	LR03	As part of the CEMP, land disturbance processes will be developed to ensure unnecessary land disturbance does not occur, including provision for site inspection by the site Environmental Manager or delegate prior to disturbance to identify any necessary environmental, cultural, drainage and erosion and sediment controls are planned and implemented as required.	Design

Table 6.32 Land resource management and mitigation measures

Impact/risk	ID	Measure	Timing
Land disturbance extent and duration	LR04	Initial earthworks and major land disturbing activities to avoid high rainfall erosivity period (summer storm season) November through to March where practical to minimise erosion. Where major land disturbing works need to occur in high rainfall erosivity periods then a commensurate level of erosion and sediment control will be adopted.	Design
Land disturbance extent and duration	LR05	The timing of stabilisation and rehabilitation works are to consider: • proximity to sensitive receptors; • soil erosivity; • slope gradient and length; • time of year (rainfall risk); and • site access.	Design
Water movement through the site	LR06	Clean upslope run-on should be diverted around areas of ground disturbance to minimise the erosion potential and volume of turbid runoff that needs to be treated.	Design
Water movement through the site	LR07	Access tracks should be designed and constructed to avoid the concentration of flow where possible. The roads should have a crowned profile in most instances with a minimum cross fall of 4% to minimise the formation of corrugations, with infall and outfall drainage only where necessary.	Design
Water movement through the site	LR08	Track drainage should be turned out using back push diversion banks or trapezoidal mitre drains where possible. Drains will need to be lined (generally rock) where flow velocities exceed the maximum permissible velocity of the soil.	Design
Water movement through the site	LR09	Track surfaces should be stabilised using a soil stabilising polymer emulsion design to minimise erosion, turbid runoff, dust emissions, watering and maintenance	Design
Water movement through the site	LR10	The waterway crossings should be a low-level concrete causeway with low flow culverts and a stilling pond type energy dissipator to minimise erosion of the watercourse downstream of the crossing.	Design
Water movement through the site	LR11	Early installation of the causeway should be a priority during track construction to allow the safe passage of clean run-on water.	Construction
Water movement through the site	LR12	Rainfall falling onto the roofs of offices and workshop facilities is clean water and should be captured using gutters and stored in tanks for re-use and overflows directed away from active construction areas	Operation
Water movement through the site	LR13	Turbid water runoff from the substation/BESS, laydown and where practicable, access tracks should be diverted to Type B sediment basins for treatment	Design
Water movement through the site	LR14	Sediment Basins should be constructed as a priority before any other land disturbances to maximise the capture of sediment and turbid runoff	Construction
Water movement through the site	LR15	Fuel storages should be self-bunded and other hydrocarbon and chemical storages bunded in accordance with AS1940	Design
Stabilisation	LR16	Progressive stabilisation and rehabilitation of disturbed areas should be undertaken to minimise erosion and the generation of sediment and turbid runoff. Due to the gentle slope gradients on site and presence of suitable quality topsoil, bonded fibre matrix hydro-mulches (BFM) are considered appropriate for site rehabilitation purposes. For slopes steeper than 1:2 a hydraulically applied growth medium (HGM) is recommended.	Construction

Table 6.32 Land resource management and mitigation measures

Impact/risk	ID	Measure	Timing
Stabilisation	LR17	Ensure that non-water soluble, mineral based, biologically inoculated fertilisers are used in any revegetation works to not impact on background landowners participating in organic or carbon farming initiatives.	Construction
Sediment retention	LR18	Type B high efficiency sediment basins with flow activated dosing systems are recommended where calculated soil loss exceeds 150 t/ha/y (Substation/BESS and Laydown Area) or control of turbidity is required to protect creek systems.	Design
Sediment retention	LR19	In-stream sediment controls should be avoided where possible by scheduling works in creeks to avoid the summer storm season.	Construction
Sediment retention	LR20	As part of the CEMP, water movement processes will be developed to minimise the potential for accidental turbid water discharge during pumping and dewatering activities on site.	Design
Erosion and sedimentation	LR21	Drainage, erosion and sediment control measures at all times until their function is no longer required.	Construction and operation
Erosion and sedimentation	LR22	Inspections of control measures need to be undertaken following rainfall that causes run-off or monthly during dry conditions.	Construction and operation
Erosion and sedimentation	LR23	Inspections should be undertaken by the site Environmental Manager or delegate. That person shall have the following knowledge: • an understanding of site environmental values that could be impacted by site construction and operation; • an understanding of the requirements of the Ministers Conditions of Approval and Environmental Protection Licence that are relevant to drainage, erosion and sediment control; • a good working knowledge of drainage, erosion and sediment control fundamentals and the project specific application thereof; • ability to provide advice and guidance on appropriate measures and procedures to maintain the site at all times in a condition representative of regionally specific best practice, and that is reasonably likely to achieve the required standards; and • a good working knowledge of the correct installation, operation and maintenance procedures for the full range of drainage, erosion and sediment control measures used on the project.	Construction and operation
Erosion and sedimentation	LR24	Control measures to be maintained to the maximum practicable extent so that control measures: • will best achieve the sites required environmental protection including achieving the water quality criteria specified in the Environmental Protection Licence in the nominated design storm event; • are in accordance with the specified operational standard for each drainage, erosion and sediment control measure; and • prevents or minimises safety risks.	Construction and operation
Erosion and sedimentation	LR25	All water, debris and sediment removed from control measures shall be disposed of in a manner that will not create an erosion or pollution hazard.	Construction and operation

Table 6.32 Land resource management and mitigation measures

Impact/risk	ID	Measure	Timing
Erosion and sedimentation	LR26	It is recommended that a hierarchical ESC planning system be adopted for construction and operation of the project consisting of an overarching project wide ESCP with Progressive ESCP's for all disturbance areas to ensure that the projects ESCP's are living documents that can and will be modified as site conditions change, or if the adopted control measures fail to achieve the desired treatment standard.	Design
Erosion and sedimentation	LR27	The ESCP's are recommended to be prepared and certified by a suitably qualified and experienced Certified Professional in Erosion and Sediment Control.	Design
Erosion and sedimentation	LR28	If a site inspection or environmental monitoring identifies a significant failure of the adopted drainage, erosion and sediment control measures, a critical evaluation of the failure should be undertaken to determine the cause and appropriate modifications made to the control measures on site and ESCP's amended.	Construction and operation
Erosion and sedimentation	LR29	All project personnel including contractors are recommended to have an appropriate level drainage, erosion and sediment training. Three levels of competency training for personnel are recommended: • Level 1 – basic awareness level training and provided during the site induction. • Level 2 – half day training for foreman, engineers, project managers etc on the legal aspects of drainage, erosion and sediment control, fundaments and site-specific strategies, techniques and requirements. • Level 3 – detailed one day training course where drainage, erosion and sediment control is a regular component of their daily activities and competence is required.	Construction and operation

6.7 Social

6.7.1 Introduction

A social impact assessment (SIA) was prepared by EMM in accordance with relevant SEARs and guidelines (refer Appendix O).

The study area for the SIA was defined as those areas that are likely to experience social impacts from the project, which include the following:

- Wuuluman;
- Montefiores;
- Wellington; and
- Dubbo Regional Council LGA.

The SIA examined a wide range of social factors and these, by necessity, require analysis of data such as demographics and economic indicators. The data alone, while essential to understand the characteristics of the community, does not reveal the community's voice about the project. The SIA therefore applies both quantitative and qualitative measures to achieve a realistic examination of how and why the project may bring positive, negative or neutral impacts to the communities in the area of social influence for the project.

6.7.2 Existing environment

i Demographics

According to the 2016 Census of Population and Housing, the local area has a total population of 5,445 people. Most of these people reside in Wellington (4,077), with a small portion residing in Wuuluman (776) and Montefiores (592). There are no population projections published for the local area.

The projected population of the regional area is estimated to increase by 7,373 people from 51,404 in 2016 to 58,777 in 2041, representing a total increase of 14.3% and an average annual increase of 0.6%.

In the local area, the largest age groups are persons aged 24–34 years (13.6%), 45–54 years (12.0%), and 55–64 years (11.9%). Overall, the local area has a higher proportion of persons aged 65 years and older (21.3%) compared to NSW (16.3%), and the regional area (16.5%). Overall, the local area has a higher proportion of persons aged 65 years and older (21.3%) compared to NSW (16.3%), and the regional area (16.5%). Within the local area there is a slightly higher proportion of youth aged 15–24 (14.1%) compared to the regional area (12.4%) and NSW (12.5%). This suggests a prominent younger population in the local area compared to NSW, as well as a significant continued aging population.

ii Qualifications and workforce

Non-school qualifications in the local area are lower than NSW for all types of qualifications, except diplomas and certificates. Within the local and regional areas, certificates comprise the largest proportion of non-school qualifications held by people over 15 years (31.5% and 40.2% respectively). This reflects the main occupations in the local and regional areas being technicians, trades workers, and labourers which typically do not require tertiary level education.

In 2016, the unemployment rate in the local area was 11.9%, which is higher than both the regional area (5.9%) and NSW (6.3%). In particular, the substantial level of unemployment in Wellington reflects the high levels of disadvantage and low levels of advantage in Wellington which ranked in Decile 1 for each of the Socio-Economic Indexes for Areas (SEIFA) indexes. Wellington also has much lower levels of Year 12 completion (29.5%) compared to NSW (59.1%) which may also significantly contribute to the high levels of unemployment in the area. The youth unemployment rate in the local area (18.3%) is higher than the rate within the regional area (12.3%) and NSW (13.6%). Labour force participation in the local area was also lower (36.7%) compared to the regional area (59.3%) and NSW (59.2%).

In the local area the top three occupations are community and personal service workers (20.4%), labourers (14.7%) and technicians and trades workers (14.2%). The significant proportion of community and personal service workers throughout the local area corresponds to the prevalence of health care and social assistance being the top industry of employment in both the regional area (15.4%) and the local area (18.2%). Both individual and household median weekly income was significantly lower in Wellington ($458 and $781 respectively) compared to both the regional area and NSW. This reflects the SEIFA scores within Wellington, which suggest higher levels of disadvantage and lower levels of advantage.

iii Local business and industry

Health care and social assistance is the top industry of employment in the local area providing 18.2% of employment, followed by public administration and safety (12.3%), and retail trade (10.5%). Whilst health care and social assistance is the largest industry of employment within Wellington and Montefiores (19.2% and 15.0% respectively), agriculture, forestry and fishing are the largest industries of employment in Wuuluman (49.0%).

Of the 5,142 registered businesses in the regional area, 22.3% were in the agriculture, forestry, and fishing industry. The industries with the next highest proportion of registered businesses across the regional area was construction (18.8%), and rental, hiring and real estate services (9.1%).

iv Social infrastructure and services

In the local area there is a total of one general practitioner (GP) practice, one hospital, one police station, a rural fire brigade, and a range of community services. Wellington has a local police station however it does not operate 24 hours a day. In the local area there is one tertiary institution: TAFE NSW – Wellington. There are additional tertiary institutions available in the regional area.

The local area is well serviced by a range of schools, childcare and health services, located in the regional area. The regional area also provides community services including Aboriginal community services, child and family services, youth community services, housing and homelessness services, employment services, disability services, aged services, and domestic violence services

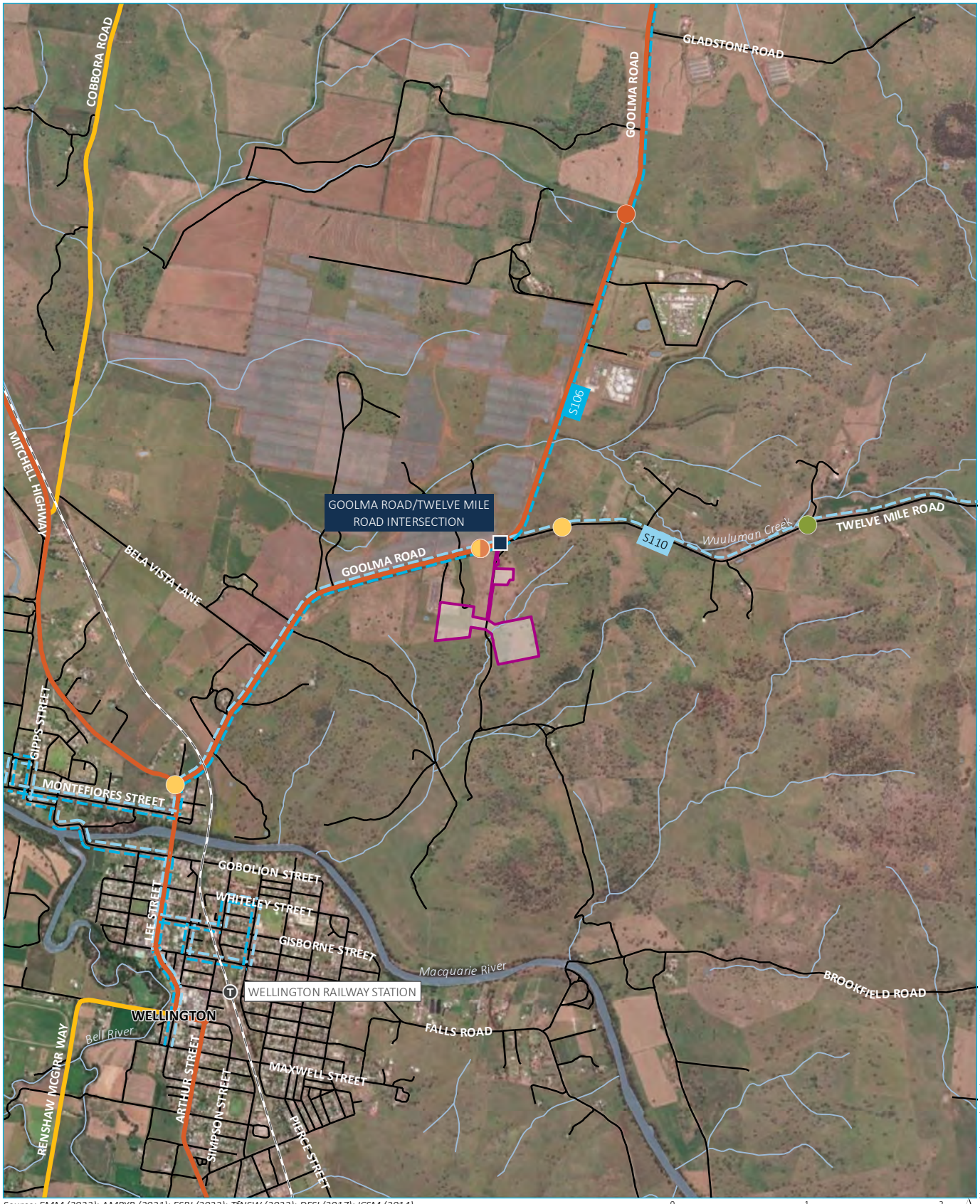
v Road infrastructure and support

Within the local area, 13 school bus services that operate in and out of Wellington (AM and PM services). Two of these bus services utilise Goolma Road and the intersection with Twelve Mile Road:

- S106 Mt Bodangora (Spicers Creek) – travels between Spicers Creek through Bodangora to Wellington; and
- S110 Umagalee (Wuuluman) – travels through Wuuluman to Wellington.

Bus service S106 operates between Mt Bodangora and Wellington Schools and travels along Goolma Road. Bus service S110 operates between Umagarlee and Wellington Schools and travels on both Goolma Road and Twelve Mile Road. In doing so, the school busses pass by the Project site entrance and utilise the Goolma Road and Twelve Mile Road intersection (refer Figure 6.14).

Goolma Road has experienced a yearly crash occurrence since 2017 with a significant increase in accidents in 2019. In 2019, there were two fatal crashes on Goolma Road contributing to a yearly count of six fatal crashes across the Dubbo Regional area. Additionally, Goolma Road in 2019 experienced three accidents that ended in serious injury, with one of these occurring at the Goolma Road and Twelve Mile Road intersection. In 2020, there was another crash at the intersection which resulted in moderate injury. Crashes along Twelve Mile Road were comparatively fewer with a crash in 2018 ending in minor/other injury and another in 2020 resulting in moderate injury.



Source: EMM (2022); AMPYR (2021); ESRI (2022); TfNSW (2022); DFSI (2017); ICSM (2014)

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GDA 1994 MGA Zone 55

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KEY

- Development boundary
- Train station
- Rail line
- Watercourse/drainage line
- Waterbody
- Key intersection

Degree of crash

- Fatal
- Serious Injury
- Moderate Injury
- Minor/Other Injury

Bus routes

- Route S106
- Route S110

NSW classified road

- State road
- Regional road
- Local road

Road network and traffic characteristics

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.14

EMM creating opportunities

vi Local housing and rental market

From March 2019 – December 2021 the residential vacancy rate for postcodes 2820, 2831 and 2830, which encompasses most of the local area and regional area, has varied across the equilibrium level of 3.0%. The residential vacancy rate for postcode 2831 and postcode 2830 has consistently remained below the 3.0% equilibrium benchmark. This indicates a lack of available rental housing (undersupply) in postcode 2831 and postcode 2830, and significant shifts between oversupply and undersupply in postcode 2820. Postcode 2820, which encompasses the local area, had a substantial oversupply of rental options between March 2019 – March 2020, with a significant drop below the 3% benchmark in June 2020, continuing until December 2021 which demonstrates an increase to 3.9%.

Within Wellington between 2006–2016 there was a 62.2% increase in rent payments which was higher than the trends across the regional area (56.3%). In addition, within Wellington, 12.9% of households had rent payments that were greater than or equal to 30% of household income which is higher than the regional area. This data relating to the rental market in the social baseline is consistent with findings from the SIA field study, with participants identifying high rental costs and a lack of affordable rental housing available within the local area, particularly within Wellington.

vii Vulnerabilities and vulnerable groups

In the local area, 7.0% of the population has a need for assistance, which is a greater need for assistance compared to NSW (5.4%). This greater need for assistance in the local area could be attributed to the higher proportion of people aged 65 years and older (21.3%) compared to NSW (16.3%). In the regional area, the need for assistance is slightly higher compared to NSW with 5.7% of the population with a need for assistance.

According to the 2016 Census estimations on homelessness, rates of homelessness in Dubbo Regional LGA are lower than NSW rates, with a rate of 30.8 persons per 10,000 across the regional area compared to the NSW average of 50.4 persons per 10,000.

At the time of the 2016 Census, 29.6% of the total population within the local area and 15.5% of the regional area population identified as Aboriginal and/or Torres Strait Islander. This proportion in the local and regional areas is significantly higher than the proportion of the population who identify as Aboriginal and/or Torres Strait Islander in NSW (3.0%). Wuuluman in particular has a significantly higher rate of people who identify as Aboriginal and/or Torres Strait Islander (47.8%), followed by Wellington (27.8%) and Montefiores (18.2%).

viii Community values

Dubbo Regional Council values the following: establishing strong community ties; improving liveability and housing affordability whilst promoting opportunities for tourism; education and training; recreation; Indigenous heritage; and the natural environment. In the 2040 *Dubbo Community Strategic Plan* (DRC 2018), Dubbo Regional Council prioritises increasing the general population, developing infrastructure to support the local community, ensuring adequate housing, ensuring economic growth, and enhancing employment opportunities whilst supporting local industries.

The Wellington community values the natural environment, rural landscapes and its colonial heritage and character, with many buildings dating to the late 1800s still standing and in use today. The Wellington Caves and Lake Burrendong are particularly of importance to the area.

6.7.3 Potential impacts

A risk-based framework has been used to provide an assessment of potential social impacts (described in detail in Section 6.2 of the SIA). Potential social impacts have been assessed based on the change to, or perceived change to the social and biophysical environment as understood through the project and SIA field study program. These include benefits and negative social impacts.

i Way of life

a Amenity related to traffic noise

The negative consequences associated with road traffic noise are anticipated to be minimal as road traffic noise levels are predicted to satisfy the relevant road traffic noise criteria at the nearest potentially affected residences (refer Section 6.3.5 and NVIA). Further, the proposed hours of construction provides a respite period from Saturday evening to Monday morning, and impacts to liveability and livelihood will be limited to the construction phase of the project.

ii Community

a Community investment, social cohesion and resilience

The development and implementation of a community and stakeholder engagement strategy will strengthen social cohesion and resilience in the local area by increasing project transparency and facilitating investment into the local community. The development of a strategy to enhance identification and implementation of shared value opportunities within the local area is also recommended. An implemented shared value approach will ensure that benefits are experienced by both AMPYR and the community which address local community issues.

iii Health and wellbeing

a Public safety related to increased traffic on Goolma Road and through Goolma Road and Twelve Mile Road intersection

Unmitigated, the impact to public safety due to an increase in traffic is assessed as high as it is considered likely for road accidents to occur when a high number of additional vehicles are on the road, some of which will be oversize and hazardous, challenging loads, and drivers are at risk of fatigue. The potential consequence for this impact is major, as any road related incidents caused by project-related traffic have the potential to result in serious injury or death, which will have a lasting impact on safety and wellbeing that may survive long after the life of the project.

Management measures (described in Section 6.7.4) will be implemented to reduce safety risks. Following mitigation, public safety impacts from project traffic is assessed as medium and the potential likelihood is reduced to unlikely. However, the consequences of a rare road accident or collision to occur remain major, as the potential for injury or death remains.

b Public safety related to increased truck movements along school bus routes on Goolma Road

The unmitigated impact of public safety issues related to increased truck movements on a school bus route is assessed as high as the likelihood of impact is possible due to both school bus services operating along Goolma Road and the potential presence of trucks during school pick-up and drop-off hours. The negative consequences are major due to potential loss of life and the broad impact it has on residents. The duration of this impact would be long-term as the grief and loss is not limited to the time of the accident and loss.

Management measures (described in Section 6.7.3) will be implemented to mitigate public safety impacts related to truck movements along school bus routes on Goolma Road. Restriction of heavy vehicles from travelling during school bus route times (occurring between 7.52 am–8.47 am and 3.07 pm–4.18 pm) is recommended to avoid the potential for adverse interactions. Following mitigation, the likelihood of impact is reduced to unlikely, with the negative consequence remaining major due to the severity of impacts associated with potential loss of life.

c Public safety related to fire hazards

The unmitigated impact of public safety issues arising from fire hazard is assessed as high as the likelihood of offsite impacts are possible despite provision to fire protection/suppression systems for the BESS, local emergency services may struggle in their capacity to respond. The magnitude level is assessed at major as the BESS will also be situated in a rural area and there is a large separation distance to the nearest dwelling(s) thus no significant offsite impact expected however it is more likely that onsite employees may be affected with potential injury or loss of life.

After implementation of measures described in the PHA (refer Section 6.5.4) the mitigated public safety impacts due to fire hazards arising from the BESS is assessed as medium. The likelihood of impact is reduced to unlikely, with negative consequences remaining major due to the severity of impact associated with potential injury or loss of life.

iv Livelihood

a Livelihood related to increased local employment opportunities

The project proposes approximately 100 full-time construction roles during the construction phase and two full-time jobs during the operation phase. Unenhanced, the benefit from increased local employment opportunities arising during the construction and operation of the project is assessed at medium. The likelihood of livelihood benefits related to increased local employment opportunities is possible, with anticipated minimal positive consequences as benefits will be realised in the medium to long term and are anticipated to result in benefits to the local economy.

A preferential approach and commitment to hiring local workers will enhance livelihood benefits related to increased local employment opportunities. Under the assumption that AMPYR successfully prioritises employment of workers with relevant skills residing within the local area, the likelihood of benefit will be likely. Minor positive consequences will arise with the enhanced measures as livelihood benefits in the form of employment may or may not be permanent, with anticipated benefits to both the local and regional economy.

b Livelihood related to training and apprenticeship opportunities

Unenhanced, the livelihood benefit related to training and apprenticeship opportunities is assessed as low. Without enhancement strategies it is possible that training, apprenticeship, and employment opportunities would be minimal and unlikely to arise due to lack of targeted strategies to involve local workers in training and apprenticeship opportunities. Therefore, the likelihood of livelihood benefits related to training, apprenticeship and employment opportunities without enhancement measures are unlikely and the positive consequence is assessed as minimal.

It is recommended that apprenticeships and training programs are tailored to the local community and promote skilled employment pathways for the project. If successfully implemented, the livelihood benefit related to training and apprenticeship opportunities increases to medium and the likelihood of benefit increases to possible. Positive consequences are increased to moderate, due to the high youth unemployment rate in the area and the potential training and apprenticeship opportunities to up-skill the local workforce. Whilst livelihood benefits in the form of employment may or may not be permanent, there would be anticipated benefits to both the local and regional economy.

v Cumulative impacts

c Rental housing

If the local rental market is inundated due to demand from the project-related construction workforce (arising from the project and other projects in the region), there is potential that rental housing scarcity will increase, and rental affordability will decrease leading to adverse outcomes. Commitments to local hiring, provision of training and apprenticeship opportunities for local workers, and partnership with local employment and training services will reduce the need for outsourcing of workers.

d Employment and industry

The project together with the multiple SSDs in the area may have the potential to benefit in local procurement of goods and services, resulting in increased opportunities for revenue for local business and therefore having a positive impact on livelihoods. However, the employment demands for the above future projects may cause potential impacts on the availability of skilled workforce in the local area, should construction periods overlap substantially. This may require additional workers to be sourced from outside the local and regional areas.

e Traffic

The TIA (Appendix L) has considered cumulative traffic impacts of the project considering the future traffic generation of existing and approved projects and developments.

There has been long-standing community concern for the intersection of Goolma Road and Twelve Mile Road, with the 100k/h speed limit along both roads being a primary factor in community perceptions of road safety risks. The construction of various developments within the vicinity of the project has the potential to generate cumulative safety impacts for the school bus services operating along Goolma Road. Consultation with the proponents of Wellington North Solar Farm and Uungula Wind Farm as well as Dubbo Regional Council, Wellington schools and bus service operator could serve as a consistent means of monitoring the safety of school bus route during construction and inform appropriate mitigation measures.

6.7.4 Management measures

The SIA details a range of mitigation and management measures as summarised in Table 6.32.

Table 6.33 Summary of mitigation and management strategies

Impact	ID	Proposed mitigation and management	Timing
Amenity related to traffic noise.	SOC01	Implement ongoing community engagement mechanism (ie dedicated project phone number and email), which provides the opportunity for stakeholders to raise complaints, grievances, and provide feedback.	Construction and operation
Community related to community investment, social cohesion, and resilience.	SOC02	Develop funding and grant opportunities within the local and regional area where need is determined.	Pre-construction and operation
Community related to community investment, social cohesion, and resilience.	SOC03	Develop a strategy for the enhanced identification and implementation of shared value opportunities within the local area.	Pre-construction and operation

Table 6.33 Summary of mitigation and management strategies

Impact	ID	Proposed mitigation and management	Timing
Community related to community investment, social cohesion, and resilience.	SOC04	Utilise a community and stakeholder engagement strategy to facilitate funding decisions that are informed by the local community, including regular meetings with local MP's, Dubbo Regional Council, local community groups, and local community members.	Pre-construction and operation
Public safety related to increased traffic on Goolma Road and through Goolma Road and Twelve Mile Road intersection.	SOC05	Action the recommendations of the TIA to improve road safety objectives along the Goolma Road.	Pre-construction and construction
Public safety related to increased traffic on Goolma Road and through Goolma Road and Twelve Mile Road intersection.	SOC06	Liaise with Dubbo Regional Council and TfNSW to explore the potential and utility of a reduction in the speed limit along Goolma Road as well as for an increase in road maintenance. AMPYR should look to implement a corporate policy that restricts its heavy vehicle fleet to travelling a maximum of 80 km/h along Goolma Road.	Pre-construction and construction
Public safety related to increased traffic on Goolma Road and through Goolma Road and Twelve Mile Road intersection.	SOC07	Implement driver inductions, including a driver code of conduct, requiring compliance with road safety procedures and prohibiting unsafe driving practices such as tailgating, convoying, and speeding. Explore carpooling and utilisation of a bus service as a way to mitigate public safety impacts and manage driver fatigue.	Pre-construction and construction
Public safety related to increased traffic on Goolma Road and through Goolma Road and Twelve Mile Road intersection.	SOC08	Continue community engagement to monitor compliance with road safety measures and encourage local residents to report any instances of unsafe driving of construction vehicles using community engagement grievance mechanisms.	Pre-construction and construction
Public safety related to increased truck movements along school bus route on Goolma Road.	SOC09	Implementing a risk prevention strategy to limit heavy vehicle traffic occurring along the school bus route during school commuting times. The school bus route occurs between 7.52 am–8.47 am and 3.07 pm–4.18 pm and it is recommended that heavy vehicles are restricted from travelling during these times. As a precaution, AMPYR should ensure that there is a reduction in heavy vehicle speed along the school bus route on Goolma Road during school commuting hours.	Pre-construction and construction
Public safety related to increased truck movements along school bus route on Goolma Road.	SOC10	Liaison between AMPYR, TfNSW, local Council and the bus operator is recommended to establish safe rural bus stops to enable the bus to draw fully off the road in conjunction with school bus zone signage.	Pre-construction and construction

Table 6.33 Summary of mitigation and management strategies

Impact	ID	Proposed mitigation and management	Timing
Public safety related to increased truck movements along school bus route on Goolma Road.	SOC11	Implementation a Driver's Code of Conduct which would manage AMPYR's contribution to these safety issues. The Driver's Code of Conduct should include a requirement for all truck drivers to give way to school bus movements.	Pre-construction and construction
Public safety related to increased truck movements along school bus route on Goolma Road.	SOC12	AMPYR to be involved in consultation with other developments in the area, namely the proponents of Wellington North Solar Farm and Uungula Wind Farm as well as Dubbo Regional Council, Wellington schools and bus service operator to establish community meetings if required to serve as a consistent means of monitoring the safety of school bus route during construction.	Pre-construction and construction
Public safety related to fire hazards.	SOC14	Action the recommendations stated in the PHA to mitigate any potential public safety risks stemming from fire hazards.	Pre-construction and construction
Public safety related to fire hazards.	SOC15	Consult with Fire and Rescue NSW (FRNSW) during detailed design of the facility to ensure that the relevant aspects of fire protection measures have been included.	Pre-construction and construction
Public safety related to fire hazards.	SOC16	Consult with the local Wellington Fire Service and the Rural Fire Service to implement a Fire Management Plan.	Pre-construction and construction
Livelihood related to increased local employment opportunities.	SOC17	Seek to appoint a construction contractor(s) who adopts a preferential approach to hiring which prioritises employment of workers with relevant skills residing within the local area, then the regional area, followed by hiring outside of these areas.	Pre-construction and construction
Livelihood related to increased local employment opportunities.	SOC18	AMPYR and/or its construction contractor(s) to work with local employment, apprenticeship and training agencies to enhance the potential of hiring of local and regional workers thereby minimising the need to hire workers from outside of the local and regional areas.	Pre-construction and construction
Livelihood related to increased local employment opportunities.	SOC19	Partnership with local employment and training agencies could create specific benefits for at-risk youth and people struggling to find employment by providing direct employment opportunities.	Pre-construction and construction
Livelihood related to increased local employment opportunities.	SOC20	Provision of apprenticeship and training opportunities.	Pre-construction and construction
Livelihood related to training and apprenticeship opportunities.	SOC21	To maximise potential benefits, it is recommended that AMPYR and/or its construction contractor(s) partner with local employment training agencies to provision for apprenticeships and training programs that are tailored to the local community and promote skilled employment pathways for the project.	Pre-construction and construction
Livelihood related to training and apprenticeship opportunities.	SOC22	It is recommended that AMPYR and/or its construction contractor(s) explore the opportunity to sponsor the licenses required for employment in the construction industry, which would enable youth, particularly in the regional area, to gain meaningful employment as well as increase their employability.	Pre-construction and construction

Table 6.33 Summary of mitigation and management strategies

Impact	ID	Proposed mitigation and management	Timing
Livelihood related to training and apprenticeship opportunities.	SOC23	Apprenticeship and employment opportunities can be further enhanced through the implementation of vocational education and training (VET) programs and work experience for schools in the local and regional area. This could encourage pathways to local employment, thereby encouraging youth retention.	Pre-construction and construction

6.8 Traffic and transport

6.8.1 Introduction

A traffic impact assessment (TIA) has been prepared by EMM (refer Appendix L). The TIA was prepared in accordance with the NSW Government's (RTA) *Guide to Traffic Generating Developments* (2002). The relevant SEARs and how they are addressed, are summarised in Appendix A and Chapter 2 of the TIA (Appendix L).

6.8.2 Existing environment

i Site location and access

The current access to the site is provided at the intersection between Goolma Road and Twelve Mile Road. The intersection is give-way controlled along Twelve Mile Road. The access traverses a sealed section of Twelve Mile Road. The existing driveway is approximately 2 m wide and connects to an internal gravelled road that extends to the landowner's residence. The internal gravelled road runs generally along the western boundary of the property and bypasses the proposed location for the temporary laydown area, the BESS compound and on-site substation.

ii Road network

An overview of the surrounding road network and traffic characteristics is presented in Figure 6.14.

Key roads within the vicinity of the project area include:

- Mitchell Highway – a state road with north-south alignment. The highway crosses the NSW border north of Bourke, and towards its southern end forms a junction with the Great Western Highway and Mid-Western Highway at Bathurst. The highway is configured with one lane in each direction, excluding near intersections. Approximately 40% of heavy vehicles associated with the construction of the project are expected to use a portion of the Mitchell Highway (and Goolma Road) to deliver plant, equipment and materials to the site.

- Goolma Road – a State Road generally running east-west, between Mitchell Highway (west) and Gulgong (east). The road is configured with one lane in each direction. Heavy vehicles will use Goolma Road to deliver plant, equipment and materials to the site. Approximately 60% of heavy vehicles will approach the site from the north/east and the remainder 40% of heavy vehicles are anticipated to approach the site from the west.

- Twelve Mile Road – a Local Road with east-west alignment, between Goolma Road at Macquarie Correctional Centre (west) and Goolma Road at Cudgegong River (east). The road is configured with one lane each way. Heavy vehicles will not utilise Twelve Mile Road.

The key intersection of relevance to the project is the Goolma Road/Twelve Mile Road intersection. The intersection is located immediately adjacent to the current site access. The location of the intersection is presented in Figure 6.15.

Figure 6.15 Goolma Road/Twelve Mile Road intersection

iii Existing traffic volumes

Traffic counts near the intersection of Goolma Road and Twelve Mile Road were obtained from Dubbo Regional Council (DRC). The count on Goolma Road (count 1) was undertaken between the period 13 October 2020 to 19 November 2020 and the count on Twelve Mile Road (count 2) was undertaken between 13 October 2020 to 26 November 2020. As per DRC traffic counts, Goolma Road AM peak hour was from 7.00 am to 8.00 am and PM peak hour was from 3.00 pm to 4.00 pm. Twelve Mile Road AM peak hour was from 8 am to 9 am and PM peak hour was from 4.00 pm to 5.00 pm.

Traffic counts for Goolma Road were also obtained from Wellington North Solar Farm (WNSF) Traffic Impact Assessment(GHD 2011). Traffic count data from DRC and GHD (2021) are presented in Table 6.34.

Table 6.34 DRC Council and GHD traffic volumes

Description		DRC Council traffic volumes		GHD traffic volumes	
		Goolma Road	Twelve Mile Road	Goolma Road	Twelve Mile Road
Survey year		2020	2020	2018	2018
Average AM Peak volume	Northbound/eastbound	170	16	157	-
	Southbound/westbound			44	-
Average PM Peak volume	Northbound/eastbound	184	19	66	-
	Southbound/westbound			135	-
Daily volume		1,939	189	2,140	-
HV %		25%	46%	18%	-

The traffic data in the above table shows that the traffic volumes on Goolma Road were approximately 10% higher in 2018 GHD count, compared to 2020 council count, possibly due to COVID-19 impact. The daily traffic in Goolma Road was over 2,000 vehicles per day where the peak hour traffic was recorded to 157 vehicles (approximately 7% of the daily total). The PM peak volumes were slightly higher than the AM peak for council counts but AM and PM peak volumes were similar for GHD count.

In Twelve Mile Road, the daily volumes were less than 200 vehicles. In summary, Twelve Mile Road carried approximately one tenth of traffic to that on Goolma Road.

iv Baseline traffic volumes

No intersection count has been undertaken as part of this study as DRC and GHD traffic data is considered to be sufficient to undertake the traffic impact assessment.

A growth factor of 1% per annum has been applied to the 2018 traffic volumes to estimate 2023 start of construction traffic volumes. Baseline traffic volumes are presented in Table 6.35.

Table 6.35 2023 baseline traffic volumes

Description		Goolma Road	Twelve Mile Road
Average AM Peak volume	Northbound/Eastbound	165	16
	Southbound/Westbound	46	4
Average PM Peak volume	Northbound/Eastbound	69	7
	Southbound/Westbound	142	15
Daily volume		2,247	219
HV %		18%	46%

v Crash analysis

Crash data from TfNSW Centre for Road Safety interactive history database for the last five years between 2016 and 2020 has been studied in the vicinity of the site.

Overall, there were five crashes on Goolma Road and Twelve Mile Road and one crash at Mitchell Highway and Goolma Road intersection. These crashes involved the following severity:

- one fatal;
- one serious injury;
- three moderate injury; and
- one minor/other injury.

The fatal crash took place in 2019 and was due to the vehicle running off-road towards left and crashing into an object. The majority of the other crashes were off road on bends, one rear end and one U-turn crash. The overall crash rate of six crashes is considered low over the 5-year period, which indicates that there are no significant road safety issues at the locality.

vi Public transport

Regional trains travelling to/from Dubbo-Sydney Central stop at Wellington which is approximately 5 km south-west of the site.

There are no public transport buses travelling along Goolma and Twelve Mile Road. There are bus services operating on Mitchell Highway linking Dubbo to Wellington operated by Odgen's Coaches and TfNSW.

There are school bus routes operating along Goolma Road and Twelve Mile Road. S106 operates between Mt Bodangora and Wellington Schools and travels along Goolma Road. S110 operates between Umagarlee and Wellington Schools and travels on both Goolma Road and Twelve Mile Road. School bus routes are shown in Figure 6.14.

Public transport in the locality is very limited and unlikely to be used by the construction or operational staff for this facility.

vii Active transport

There is no walking or cycling infrastructure in the vicinity of the site due to its rural location.

viii Future road improvements

As part of the conditions of consent for the Uungula Wind Farm (SSD 6687), CWP is committed to undertake the following road upgrades in support of the use of Goolma Road and Twelve Mile Road for the transport of plant and equipment during construction of that project:

- the closure of the existing intersection at Goolma Road and Twelve Mile Road;
- the construction of a new intersection 400 m to the north and realignment of Twelve Mile Road to connect to the new intersection; and
- upgrades to Twelve Mile Road along the transport route.

The indicative location of the proposed intersection and upgrade works is reproduced in Figure 6.16. At the time of this study, the detailed design was being considered by DRC and TfNSW. It is understood that the extant section of Twelve Mile Road will ultimately be closed.

It is important to note that the project will not contribute to higher turn movements at the realigned Goolma Road/Twelve Mile Road intersection, as heavy vehicles associated with the project will primarily use Goolma Road to/from the Mitchell Highway. This means any traffic to/from the west will travel straight through the realigned intersection.

The access road from Twelve Mile Road to the Uungula Wind Farm site will be improved to facilitate the access and egress of larger trucks during construction of that project. Improvements would include gravel coverage, widening to 8 m and additional drainage, as required. The road will be maintained by CWP during operation to allow for the access and egress of maintenance and operational vehicles.

At the time of writing, construction of the intersection upgrade works was yet to commence as per CWP's previously indicated schedule. In August 2022, immediately prior to finalisation of the TIA and EIS for exhibition, consultation with CWP indicated that their current schedule for Uungula Wind Farm is targeting project construction commencement later in 2022, with the road upgrade works to be undertaken in advance of construction commencement in accordance with their conditions of consent. Based on this, it is anticipated that the proposed upgrades to the intersection will be completed prior to commencement of construction of the Wellington BESS project, which is earmarked to commence in May 2023.

It should be noted that the relocated intersection further north will improve site access and traffic safety for proposed site access for this project.

Source: DPIE - SSD 6687 Development Consent

Figure 6.16 Proposed location of Goolma Road/Twelve Mile Road intersection

6.8.3 Potential impacts

i Construction traffic

The following daily construction vehicle movements are anticipated:

- an average of up to 100 light vehicle trips per day (100 in and 100 out) during the construction works phase; and
- an average of up to 60 heavy vehicle trips per day (60 in and 60 out) during the construction works phase.

The following assumptions have been made to anticipate peak hour construction vehicle movements:

- a maximum of 80 light vehicle trips during the morning and evening peak hour (80 in and 80 out); and
- a maximum of 30 heavy vehicle trips during the peak hour (30 in and 30 out).

Passenger vehicles are expected to arrive at the site prior to commencement of construction shifts. Construction vehicles are anticipated to be primarily via regional centres including Dubbo/Wellington (60%) and Gulgong (40%) and are anticipated to travel to the site via the Mitchell Highway and Goolma Road (west) and Goolma Road (east), respectively.

Heavy vehicle movements, particularly those associated with the delivery of materials and equipment will generally be evenly spread throughout construction hours. Most heavy vehicles are anticipated to be via Sydney/Newcastle and surrounding regional centres (60%). Some heavy vehicles will also originate from Dubbo, Orange, and Parkes (40%). Vehicles travelling from Sydney and Newcastle are anticipated to travel to site via the Castlereagh Highway and Goolma Road (east), an approved B-double route. Other vehicles are anticipated to access the site via the Mitchell Highway and Goolma Road (west).

There will be up to 20 Oversize Overmass (OSOM)[1] vehicles during the construction works phase. Relevant permits from the National Heavy Vehicle Regulator will be acquired for the project prior to mobilization. OSOM vehicles movements will occur outside of standard construction hours and are anticipated to be wholly via Sydney/Newcastle and are anticipated to travel to site via the Castlereagh Highway and Goolma Road (east) route.

Construction traffic movements associated with the project are presented in Table 6.36. Traffic transport routes are presented in Figure 6.17.

[1] *An oversize or overmass vehicle is a heavy vehicle or combination which alone, or together with its load, exceeds prescribed mass or dimension requirements, and is a heavy vehicle carrying, or designed for the purpose of carrying, a large indivisible item (HVNL s116 (1) (c)). This does not include road trains or B-doubles, or vehicles carrying a freight container designed for multimodal transport. Examples include a prime mover and extendable trailer or a prime mover and low loader combination.*

Table 6.36 Construction traffic movements

Description		Goolma Road	
		Light vehicles	Heavy vehicles
AM peak (7.00 am to 8.00 am) movements	Eastbound	48	30
	Westbound	32	30
PM peak (4.00 pm to 5.00 pm) movements	Eastbound	32	30
	Westbound	48	30
Average daily movements		320	

ii Cumulative construction traffic

Development in vicinity of the project has the potential to generate cumulative traffic impacts with the project. The greatest potential for cumulative impacts of future projects and the project in relation to traffic are associated with the following two projects, which have the potential to have construction periods that overlap with the project:

- construction of the Wellington North Solar Farm (SSD 8895); and
- and Uungula Wind Farm (SSD 6687), including associated upgrades to the Goolma Road/Twelve Mile Road intersection and Twelve Mile Road.

Estimated traffic movements associated with construction of these two projects were obtained through consultation with the proponent and/or review of publicly available information associated with the EIS for the project.

The cumulative traffic estimate, which is the summation of baseline traffic volumes (Table 6.35); construction traffic movements for the project (Table 6.36), traffic volumes associated with the Welling North Solar Farm (refer Table 3.3 of the TIA, Appendix L) and Uungula Wind Farm traffic (refer Table 3.4 of the TIA, Appendix L) is presented in Table 6.37.

Table 6.37 Cumulative traffic movements

Description		Goolma Road				
		Baseline	Project Construction	Wellington North	Ungula Wind Farm	Total
AM peak movements	Eastbound	165 (16)	48 (30)	66 (19)	100 (11)	379 (76)
	Westbound	46 (4)	32 (30)	0 (19)	100 (10)	178 (63)
PM peak movements	Eastbound	69 (7)	32 (30)	0 (19)	100 (10)	201 (66)
	Westbound	142 (15)	48 (30)	66 (19)	100 (11)	356 (75)

Note: Values in brackets are heavy vehicle movements and values outside brackets are light vehicle movements.

The cumulative traffic movements in this section present a worst-case scenario where peak construction stages of nearby developments are assumed to overlap with peak construction period of the project. The above table shows that there will be highest eastbound traffic generation during the AM peak and vice versa during the PM peak, should all the projects occur simultaneously.

The traffic and transports assessments for WNSF (GHD, 2021) and UWF (Samsa Consulting, 2020) do not mention the construction start and end months/year of their respective developments.

In August 2022, immediately prior to finalisation of this TIA and EIS for exhibition, LSbp (2022) announced commencement of construction early works at WNSF, indicating construction completion in 2024. Similarly, in August 2022, consultation with CWP indicated that their current schedule for Uungula Wind Farm is targeting project construction commencement later in 2022, with the road upgrade works to be undertaken in advance of construction commencement.

Based on the most recent information regarding both WNSF and UWF construction timing, it is likely that both projects will have commenced construction before the end of 2022.

The TIA has therefore considered a cumulative traffic impact scenario associated with construction of the Wellington North Solar Farm and Uungula Wind Farm developments concurrently with construction of the project. This allows for a conservative assessment to determine the worst possible scenario, in terms of traffic impacts due to this project. Further, the worst case construction traffic scenario has been considered for the project, which is represented by a single stage construction scenario (as opposed to a staged construction scenario, whereby daily and peak hourly construction traffic generation would be a smaller percentage of the single stage construction scenario traffic generation).

a Mid-block capacity

The mid-block Level of Service (LOS) on rural and urban roads is assessed based on a vehicle's average travel speed. There are six levels of service – LOS A to C are good to satisfactory, D is nearing capacity, E is at capacity an F is unsatisfactory.

A mid-block capacity analysis was undertaken for Goolma Road, west of the site access, during construction. The analysis is based on vehicle's average travel speed and is a measurement of traffic condition. The Goolma Road mid-block capacity (LOS) is expected to operate at LOS B in the baseline traffic scenario and at LOS D in the cumulative traffic scenario. The reduction in the LOS (by two levels) is only for the duration of the assessed period which corresponds to the period of peak construction activity. When the project construction work has been completed, the LOS will return to the baseline traffic conditions. The LOS D is considered close to the limit of stable traffic flow but is expected to be experienced during construction period only.

Further, this assessment has been carried out for a worst-case scenario where it is assumed that traffic from nearby developments, project construction traffic and road network traffic would all overlap in the same morning and evening peak hours. This is considered highly unlikely, and arrival and departure patterns of traffic may not necessarily coincide.

b Road safety assessment

Goolma Road has a speed limit of 100 km/h near the intersection. In accordance with *Austroads Guide to Road Design Part 4A (Unsignalised and Signalised Intersections)* (Austroads 2017), for a road with design speed of 110 km/h (design speed is generally 10 km/h higher than the speed limit), the minimum SISD required for a general minimum 2 second driver reaction time is 285 m.

The sight distances on Goolma Road at the site access have been estimated based on the line of sight and observation. Based on the estimated sight distance analysis, the sight distance to the left is in excess of 800 m and therefore meets the minimum requirement (285 m) as stipulated in the Austroads Guide to Road Design. Sight distance to the right is limited due to an existing roadside tree and the moderate bend on Goolma Road. This has restricted the sight distance to approximately 220 m to the right.

It should be noted that there are warning signs on both approaches of Goolma Road, warning motorists to reduce speed to 85 km/h before the bend.

The sight distance can be improved by removing the tree hence allowing visibility to a greater distance.

The removal of the roadside tree (refer TIA, Plate 5.1) and presence of speed reduction warning signs will adequately address the existing sight distance issues to the right from the site access.

c Turn movements

Based on the cumulative traffic volumes for the Goolma Road/site access road intersection, the following turn treatments will be required for the project construction traffic access:

- an auxiliary short left turn treatment (AUL(S)) will be required for left turning traffic from Goolma Road southbound to site access road; and
- a channelized right turn treatment (Austroads Type CHR) will be required for right turning traffic from Goolma Road northbound to site access road.

In consultation with DRC and TfNSW, a draft concept design for the site access intersection has been prepared as illustrated in Appendix B of the TIA (Appendix L). The concept plan shows that short left and right turn bays are provided from Goolma Road to the site. The intersection geometry is determined by the swept path assessments by a 26 m B-double truck which is the longest construction vehicle accessing the site.

It should be noted that despite the Austroads turn warrant requiring a full right turn bay during the AM peak hour, a short right turn bay CHR (S) is provided due to the following reasons:

- this intersection is designed in line with the already approved realigned Goolma Road/Twelve Mile Road intersection;
- the site access off Goolma Road is not a public road. As stated in Section 4.1.5 of the TIA, during operation, there will be maximum four vehicles per day. Therefore, a short right turn bay should be sufficient to cater for the traffic demand for the right turning vehicles onto the site during operation; and
- the right turn bay would accommodate two 26 m long B-double trucks. This is sufficient storage without impacting eastbound traffic on Goolma Road.

Based on the above considerations, a short right turn bay is justifiable. However, during construction, necessary traffic management may need to be in place to minimise any traffic impact on Goolma Road.

The concept plan was presented to DRC as part of consultation activities in August 2022, with DRC representatives providing in principle support of the concept subject to detailed design. In addition, the concept design plan has been provided to TfNSW for consideration and comment in advance of exhibition of the EIS for the project. Consultation with TfNSW is ongoing and will continue during the EIS exhibition and response to submissions phase of the project, including further consideration of access options via Twelve Mile Road and construction timing for Uungula Wind Farm committed road upgrade works as additional information becomes available. The concept design will be refined in consideration of feedback received from TfNSW.

iii Operation

There will be four daily trips during the operation stage of the development (three light and one heavy vehicles). These volumes are significantly lower than the construction traffic generation and unlikely to have any noticeable impact to the adjoining road network. Therefore, traffic impact for 10-year horizon is not required.

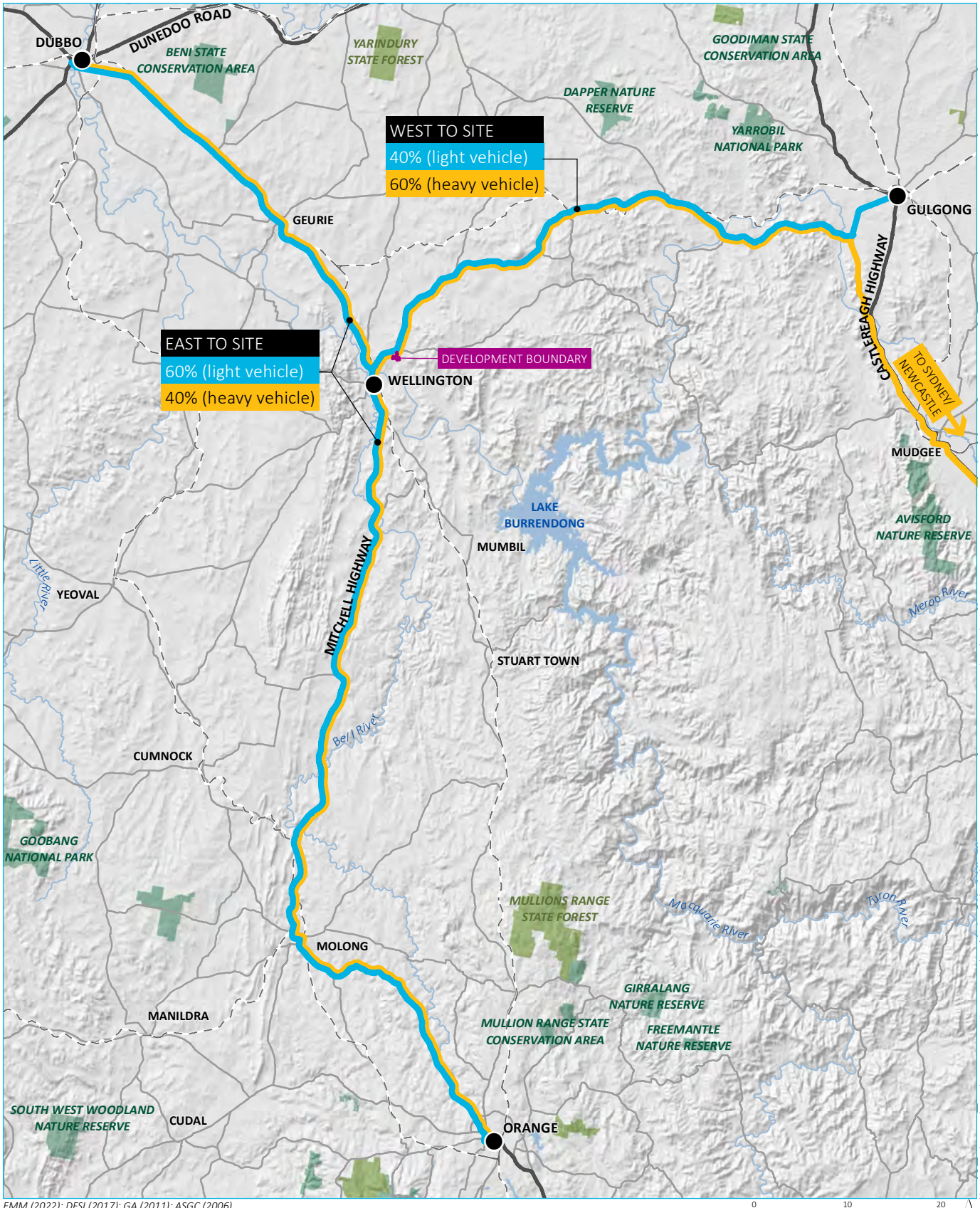
iv Staged construction

As there is a likelihood of construction of the project occurring in two stages, this may result in Stage 1 operational traffic coinciding with Stage 2 construction traffic for the duration of the Stage 2 construction.

Stage 1 operational traffic would consist of up to two staff vehicles and one heavy vehicle for maintenance activities. Stage 2 construction traffic would be reduced in comparison to Stage 1 construction, as some construction activities such as site establishment works, intersection upgrade works, and parts of construction works (civil works, structural works, and electrical works) would already be completed during Stage 1 construction.

The staged construction works would reduce the peak construction traffic movements in comparison to single stage construction scenario and is not expected to generate significant traffic impacts if coinciding with nearby development traffic.

The overlap of Stage 1 operational and Stage 2 construction traffic is unlikely to result in significant traffic impacts. However, an operational traffic management plan may be required to ensure that operational traffic and construction traffic does not compromise any traffic or pedestrian safety within the project site.



EMM (2022); DFSI (2017); GA (2011); ASGC (2006)

0 10 20 km

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KEY

- Development boundary
- Rail line
- Motorway/primary road
- Arterial/subarterial road
- River
- Named waterbody
- NPWS reserve
- State forest

Transport route

- Light vehicle
- Heavy vehicle

Transport routes

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.17

EMM creating opportunities

6.8.4 Management measures

i Construction phase

The proposed traffic management mitigation measures for the construction phase are outlined in Table 6.38.

Table 6.38 Proposed mitigation measures during construction phase

Requirement	ID	Mitigation measure	Responsibility	Timing
Need for intersection upgrades.	T01	Following Uungula Wind Farm project's upgrade of Goolma Road/Twelve Mile Road intersection, install an auxiliary short left turn bay (AUL(S)) and a channelised short right turn bay (CHR(S)) at the Goolma Road/Site Access Road intersection, as shown in Appendix B of the TIA (Appendix L).	AMPYR Australia Pty Ltd (AMPYR) and Shell Energy (Shell)	Pre-construction
Worksite traffic control and confirmation of other management measures.	T02	A detailed construction traffic management plan (CTMP) will be developed by the construction contractor in consultation with Dubbo Regional Council prior to the commencement of works.	Contractor	Pre-construction
Access by oversize vehicles.	T03	Obtain a permit from NHVR to allow OSOM vehicles to use the road network as part of construction.	Contractor	Pre-construction
To address restricted sight distance to the right of site access along Goolma Road.	T04	Consider removal of tree hence allowing visibility to a greater distance. Construction stage traffic management measures such as warning signs for trucks entering (sign no. t2-25, to be confirmed in the CTMP).	Contractor	Pre-construction

ii Operation phase

No material traffic impacts are expected during the operations phase. Accordingly, no mitigation measure is proposed for the operations phase.

iii Decommissioning phase

Works undertaken during decommissioning will not exceed the intensity associated with construction works and is expected to take up to 8 months. Traffic generation associated with decommissioning activities would therefore be a proportion of that estimated for the construction scenario considered herein and limited traffic impacts are expected during the decommissioning phase as all mitigation measures proposed during construction stage will have been implemented. Accordingly, no mitigation measures are proposed for the decommissioning phase.

6.9 Visual

6.9.1 Introduction

A visual impact assessment (VIA) was prepared by EMM to support this EIS (Appendix J) in accordance with the relevant governmental assessment requirements. There are no Commonwealth, NSW or local government planning policies, guidelines or standards directly applicable to this assessment. The relevant SEARs and how they have been addressed, are summarised in Appendix A and Section 1.3 of the VIA (Appendix J). The VIA was prepared with reference to the methods outlined in:

- *Draft Large-Scale Solar Energy Guideline* (2021) (the Draft Guideline), prepared by the NSW Department of Planning, Industry and Environment;
- *Guidelines for Landscape and Visual Impact Assessment Third Edition* (2013) (the GLVIA), prepared by the Landscape Institute and Institute of Environmental Management and Assessment; and
- Wind Energy: *Visual Assessment Bulletin AB 01 For State Significant Wind Energy Development* (2016) (the VA Bulletin) prepared by DPE.

6.9.2 Existing environment

i Surrounding land uses

The project is located in a rural setting with the wider region characterised by grazing properties, small-scale farm businesses, natural areas, scattered rural dwellings and towns. The major transport infrastructure is the Dubbo–Orange railway and the Mitchell Highway.

The majority of the land surrounding the project boundary is zoned RU1 primary production and SP2 electricity generating works under the Dubbo LEP (Figure 1.3). Land uses surrounding the project area are predominantly agricultural (ie livestock grazing). Cattle and sheep grazing for wool, breeding stock and meat dominate agricultural activities.

North of the site, across Goolma Road is the existing Wellington Solar Farm, which covers in the order of 400 ha.

ii Electricity transmission

The project site is adjacent to an existing TransGrid substation. This has a number of 132 kV and 330 kV above ground transmission lines connecting to it (Figure 1.2). These transmission lines are carried by 50–60 m high steel towers that traverse the landscape toward the east and west from the substation.

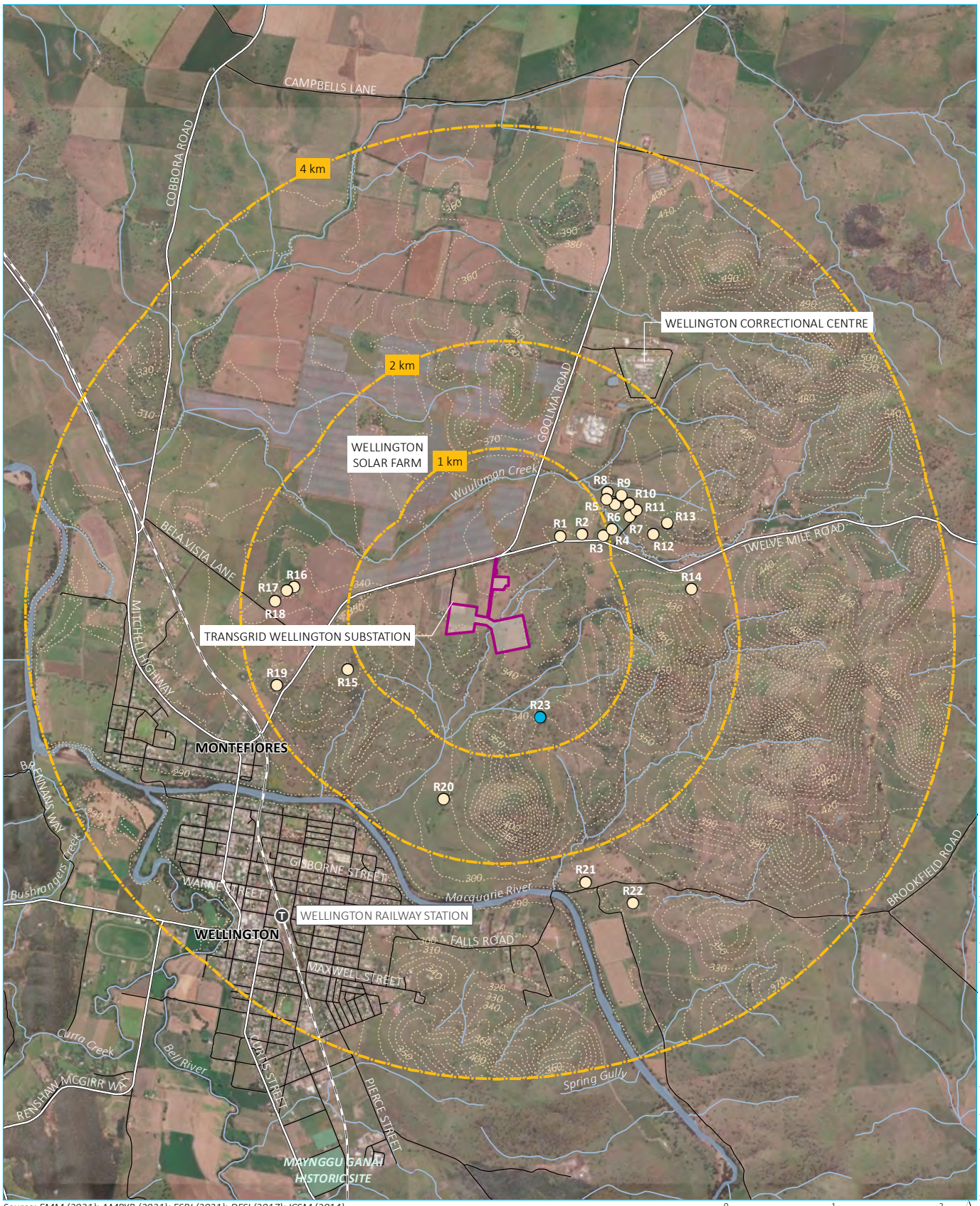
iii Rural dwellings

There are a number of non-project related dwellings have been identified in the landscape surrounding the project area. Non-project related dwellings considered as part of this assessment are identified on Figure 6.18 and include:

- three dwellings within 1 km of the project area, including dwellings on:
  - Twelve Mile Road;
- 17 dwellings within 2 km of the project area, including dwellings on:
  - Twelve Mile Road, Cadonia Drive, Cadia Place, Goolma Road, Bela Vista Lane;
- two dwellings within 4 km of the project area, including dwellings on:
  - Falls Road and Brookfield Road within the outskirts of Wellington.

A key consideration of the project design refinement process has been potential visibility of project infrastructure from the identified rural dwellings.

One rural dwelling (R23) owned by the project landholders has not been considered as part of this assessment. However, the design of landscape screening has been negotiated with the resident.



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

0 1 2 km

GDA 1994 MGA Zone 55

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KEY

- Development boundary
- Viewshed buffer
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Receivers

- Non-project residential receivers
- Project participating landowner

Nearby visual receptors

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.18

EMM creating opportunities

iv Traffic routes

The only road access to the project site is via Goolma Road. This intersects with Twelve Mile Road near the existing site access driveway.

The closest regional road is the Mitchell Highway, which serves as the main connection between Dubbo and Orange. It runs through Wellington, serving as the main transportation route through the area.

v Air traffic

Wellington Airport is approximately 7.5 km north of the project area. The proposed development is not expected to have reflective elements that might generate glint and glare that would impact air traffic.

vi Night lighting

Existing sources of night lighting in the immediate vicinity include the existing substation with its adjoining buildings. The substation has pole-mounted area lights and lights on the building as well.

The closest non-project related residence is 500 m from the proposed driveway entry off Goolma Road and 900 m from the proposed BESS location. There is a project related residence 400 m south of the proposed BESS location. These two residences are the closest light sources to the proposed project site

vii Other developments

There are two existing energy operations nearby. The Wellington Solar Farm is located directly opposite Goolma Road from the proposed BESS. This is still in the final stages of construction and commissioning. The Bodangora wind farm is located 12 km north of the project site and is operational.

Two other solar farms northwest of Wellington are approved but not yet under construction – Wellington North Solar Farm and Maryvale Solar Farm.

6.9.3 Potential impacts

i Overview

a Construction

The most visible elements of the construction process will be the improvements to the access road and the temporary laydown yard. These are close to the roadways and will be visible. Secondly, the construction of the transmission towers will be visible as the towers are lifted into place.

There will be a need for heavy machinery for the civil works and site preparation. This will include modifying the access road and leveling the BESS area. These works, along with the movement of machinery have the potential of causing visual impacts.

Due to the temporary nature, the site establishment works and construction activities are considered unlikely to have significant visual impacts on passing motorists or nearby receptors. Subsequently, landscaping is not proposed to mitigate visual impacts during the construction stage of the project.

b Operation

To determine potential visibility of project infrastructure, a viewshed analysis was undertaken as discussed below.

c Glare analysis

Due to the low level of reflectivity of the project structures, they are not expected to cause a distraction to motorists travelling along the nearby roads. Further, glint and glare are not expected to impact any receptors.

d Night lighting

The only lighting proposed are for security and unplanned maintenance purposes. This night lighting would be inwardly focused and would not result in light spill impacts to neighbouring properties or the dark sky requirements.

ii Assessed viewpoints

As part of the VIA (Appendix J), a number of site inspections have taken place between November 2021 and March 2022 to ground-truth the representative viewpoints identified during the initial desktop analysis and discuss potential views of project infrastructure with neighbouring landholders. During these inspections, photographs from these representative viewpoints were captured and a selection of these photographs was used as representative viewpoints for the assessment. The representative viewpoints were selected based on the following criteria:

- proximity to the BESS;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- local topography; and
- presence of remnant vegetation and wind breaks with potential to provide screening.

The locations of the receptors considered as part of this assessment are illustrated in Figure 6.18. As part of the preparation of the VIA, a total of 20 non-project related receptors were identified within 2 km of the development footprint.

To determine potential visibility of project infrastructure, a viewshed analysis was completed. The viewshed analysis was generated using a digital elevation model (DEM) and a digital surface model (DSM), both of which cover the development footprint, the 10 selected viewpoints and their immediate surrounds. The DEM and DSM were built using publicly available ELVIS spatial data from the Foundation Spatial Data Framework.

The locations of the 10 viewpoints considered as part of the assessment are illustrated in Figure 6.19. The rationale for the selection of each of the viewpoints analysed are summarised in Table 5.1 of the VIA (Appendix J). Viewshed analysis is illustrated in Figure 6.20. Viewshed analysis figures for each individual viewpoint are illustrated in Appendix A of the VIA (Appendix J).

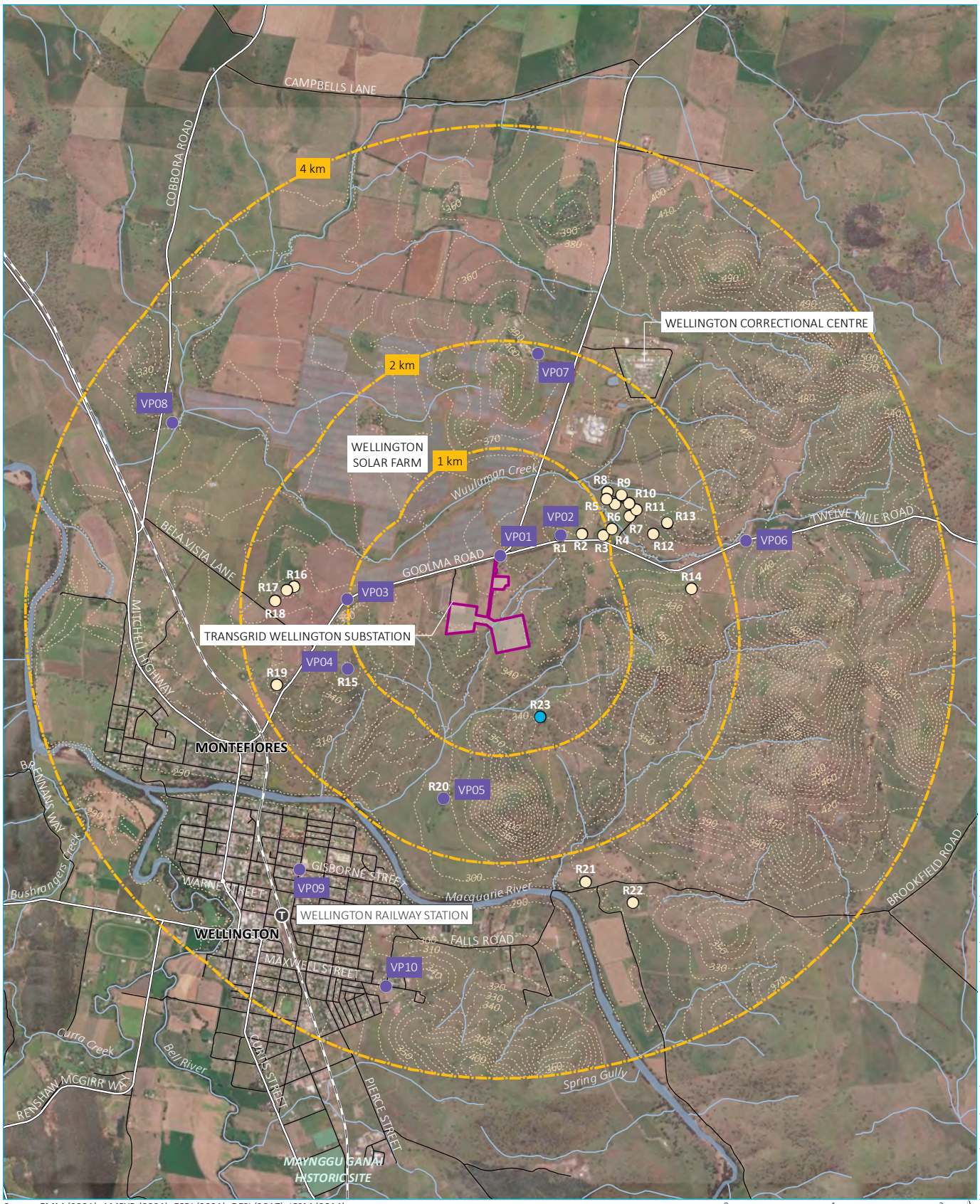
The anticipated visual impacts resulting from the project have been assessed from ten representative viewpoints. The expected impacts are summarised in Table 6.39.

Due to existing mature vegetation, variable elevation and undulation in the landscape, the BESS and substation infrastructure will be relatively shielded from view from most of the viewpoints. The exception would be the addition of transmission towers, which will sit next to existing towers. Even though the proposed BESS and substation has the potential to alter the existing visual amenity of the area, the site selected is adjacent to an existing substation, which has already introduced electrical transmission infrastructure into the landscape. In this context, the visual landscape will not be altered significantly with proposed infrastructure placed adjacent to similar infrastructure that is already a part of the visual character of the area.

Visual impacts from most of the viewpoints are limited to the proposed transformer towers and the transmission towers. Because of the hilly topography and trees existing in the landscape most receptors outside of a 1 km radius of the project site will not see the BESS compound.

The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from all 10 viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the proposed transmission towers, the impact assessment predicts:

- a moderate visual impact from viewpoint 4 (R15), which reduces to low impact after mitigation (refer Section 6.9.4); and
- low visual impacts from the remaining viewpoints.



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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KEY

- Development boundary
- Viewpoint
- Viewshed buffer
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

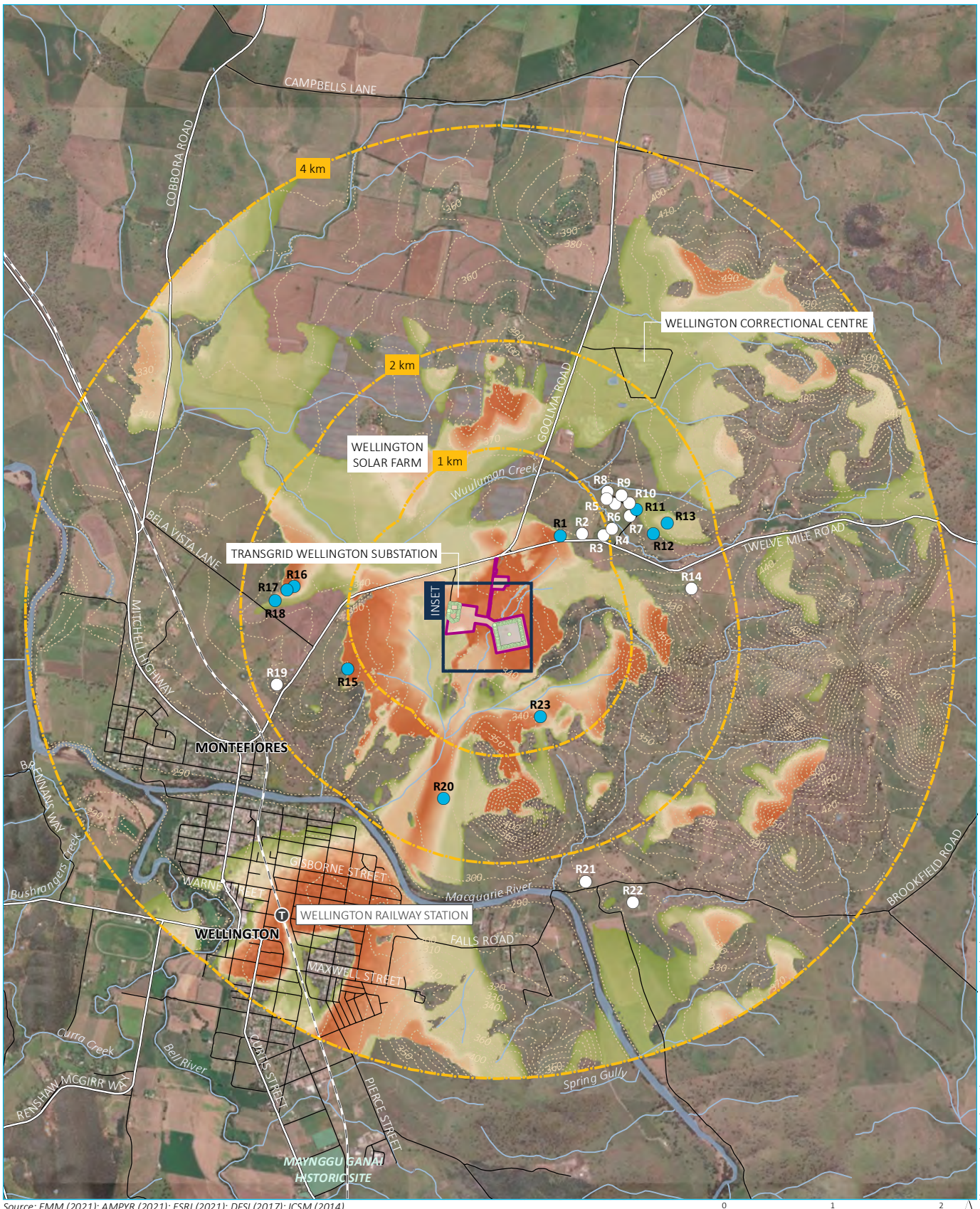
Receivers

- Non-project residential receivers
- Project participating landowner

Viewpoint locations

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.19

EMM creating opportunities



Source: EMM (2021); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

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INSET

KEY

- Development boundary
- Train station
- Rail line
- Major road
- Minor road
- Topographic contour (10 m interval)
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Viewshed results

- Viewshed model point
- Viewshed buffer
- 296 visible modelled points
- 1 visible modelled point

Receivers

- Not visible to any modelled points
- Visible to at least 1 model point

Viewshed analysis

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.20

EMM creating opportunities

Table 6.39 Summary of results of visual impacts at each viewpoint

Viewpoint	Distance to project area	Representative receptors	Residential or public	Project infrastructure visible based on viewshed analysis	Magnitude of change	Visual sensitivity	Visual impact rating	Significant impact	Mitigation proposed	Visual impact rating after mitigation	Potential for cumulative impacts
Viewpoint 1	650 m	Motorists	Public	Yes	Low	Low	Low	No	Yes	Low	No
Viewpoint 2	780 m	R1, R2, R3, R4	Residential	Yes	Low	Moderate	Low	No	Yes	Low	No
Viewpoint 3	1.33 km	R16, R17, R18	Residential	Yes	Low	Moderate	Low	No	Yes	Low	No
Viewpoint 4	1.1 km	R15	Residential	Yes	Moderate	High	Moderate	Yes	Yes	Low	Yes – limited to existing substation and transmission towers
Viewpoint 5	1.5 km	R20	Residential	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 6	2.15 km	Motorists	Public	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 7	2.52 km	Motorists	Public	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 8	3.69 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 9	2.67 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No
Viewpoint 10	3.20 km	Motorists and dwellings	Public and private	Yes	Low	Moderate	Low	No	No	Low	No

Notes: Distance is measured from the BESS enclosure to the viewpoint location.

6.9.4 Management measures

i Landscaping

Landscape screening is proposed around the BESS compound and along the eastern side of the access road to mitigate visual impacts at the following:

- north and east of the site – the proposed landscaping will screen views from the north and east, which includes views from R1, R2, R3, R4, Goolma Road, and Twelve Mile Road;
- west of the site – the proposed landscaping will screen views from the west, including R15; and
- south of the site – discussions between AMPYR and the project landholder will inform requirements for landscaping to mitigate views at R23.

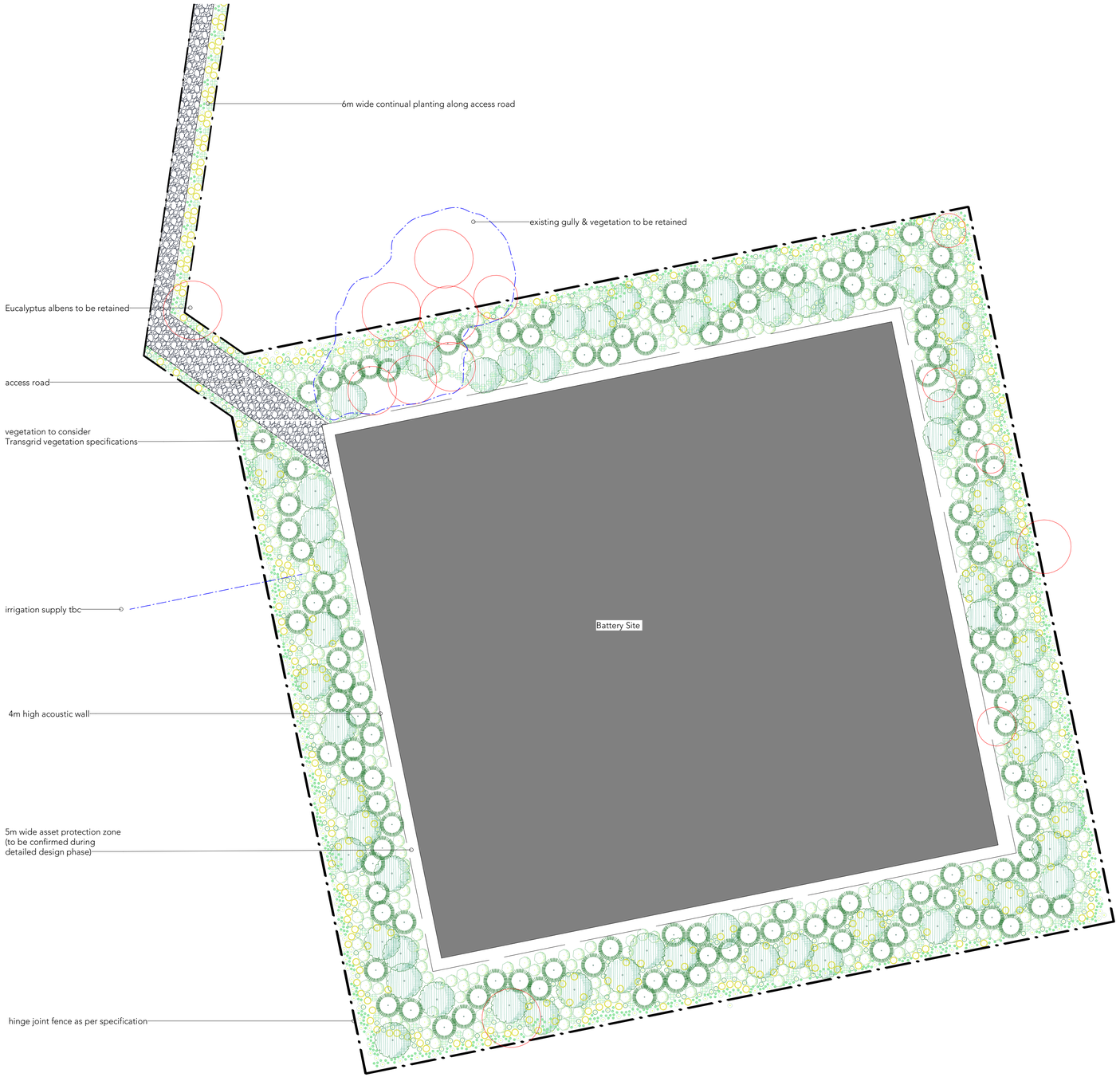
The final location and extent of landscaping will be determined during detailed design and following subsequent discussions with the property owners of R23 as part of preparation of the environmental management plan (EMP). A conceptual landscaping plan is shown in Figure 6.21.

Subject to local conditions (ie soil quality and water availability), it is anticipated that within two years, proposed landscaping will provide sufficient coverage to partially screen project infrastructure.

Development of the project design has included and will continue to include general measures to reduce the degree of contrast between project infrastructure and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project. Table 6.40 summarised the proposed management measures to reduce potential visual impacts associated with the project.

Table 6.40 Visual management and mitigation measures

Impact/risk	ID	Measure	Timing
Visual impacts	VIS01	Development of the project design has included and will continue to include general measures to reduce the degree of contrast between project infrastructure and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project.	Design
Visual impacts	VIS02	Where possible, suitable colours and finishes will be chosen for project infrastructure to minimise visual impacts (including glare/reflectivity), including the O&M buildings/facilities and the acoustic wall surrounding the BESS area. These buildings and materials will be designed to blend in with the local rural/farming landscape. If practicable, the wall may be painted in a neutral colour (eg khaki, beige, green or similar) rather than white, so as to better blend in with the local rural landscape.	Design
Visual impacts	VIS03	Landscaping to be installed along all boundaries of the BESS compound in accordance with the conceptual landscape plan, including use of suitable vegetation species identified in the VIA. The final location and extent of landscaping will be determined during detailed design and following subsequent discussions with the property owners of R23 and local suppliers as part of preparation of the environmental management plan (EMP).	Design



N

0 10000 20000 40000 80000

plant schedule:

code	botanical name	common name	pot size	height	width	qty
trees						
	Eucalyptus albens	White Box	Forestry tube	25m	15m	64
	Callitris glaucophylla	White Cypress	Forestry tube	20m	4m	126
	Eucalyptus albens to be retained					
shrubs						
	Acacia implexa	Hickory Wattle	Forestry tube	8m	5m	318
	Bursaria spinosa	Native Blackthorn	Forestry tube	8m	4m	353
	Acacia decora	Western Silver Wattle	Forestry tube	4m	2m	373
	Acacia paradoxa	Kangaroo Thorn	Forestry tube	3m	3m	444
	Lomandra longifolia	Spiny Headed Mat Rush	Forestry tube	1.5m	1m	1098
	Hardenbergia violaceae	Happy Wanderer	Forestry tube	1m	2m	355

material schedule:

code	
	waratah - hinge joint fence to landowner specification - by others
	acoustic fence - material and layout to be confirmed - by others
	indicative bore water irrigation supply line - by others

CONCEPT

barnson
DESIGN. PLAN. MANAGE

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Client: AMPYR Australia Pty Ltd

Project: WELLINGTON BESS PROJECT @ 6773 GOOLMA ROAD WUULUMAN, NSW

Drawing Title: PLANTING HIERARCHY

Rev	Date	Amendment
A	19.05.2022	CONCEPT
B	25.05.2022	REVISED CONCEPT

Design	Drawn	Check
BP	BP	CR

Sheet 02 of 06

Drawing Number: 36217- LA01

Revision: B

6.10 Surface water and flooding

6.10.1 Introduction

A water assessment (WA) was prepared by EMM (Appendix M). The WA was prepared with reference to relevant guidelines and policies, as outlined in Section 1.3 of the WA. The SEARs and how they are addressed, are summarised in Appendix A and Section 1.3 of Appendix M.

6.10.2 Existing environment

i Existing watercourses

The project area lies predominantly within the catchment of an ephemeral second order watercourse, referred to as Watercourse A, a tributary of the Macquarie River. The hydrologic context for the project is illustrated in Figure 6.22.

In proximity to the proposed location to the project, Watercourse A is crossed by a farming track via an existing bed level crossing (refer Photograph 6.1). Watercourse A then continues to the west where it crosses a second existing access track via a reinforced concrete pipe culvert (refer Photograph 6.2).

Photograph 6.1 Existing bed level crossing at Watercourse A

Photograph 6.2 Existing culvert crossing at Watercourse A

Minor portions of the development lie on the catchment boundaries of a neighbouring, ephemeral second order watercourse to the west (Watercourse B) and Wuuluman Creek to the north. Wuuluman Creek is an ephemeral third order watercourse located to the north of the project area, across Goolma Road adjacent the Wellington North Solar Farm. Watercourse B comprises ephemeral first and second order tributaries which subsequently join Watercourse A, approximately 900 m downstream of the project site and 1 km upstream of the Macquarie River confluence.

All watercourses are tributaries to the Macquarie River, immediately upstream of the township of Wellington. Upstream of the Macquarie River lies Burrendong Dam, a major online gated structure which provides irrigation and municipal water supply, hydroelectric power generation and flood mitigation, controlling downstream flood levels in the Macquarie River.

ii Water quality

No known water quality monitoring data is available for surface water runoff generated within the site.

The water quality of the Macquarie River downstream of Burrendong Dam been rated by DPIE (DPIE 2020e) as fair. Water quality degradation occurring within the catchment is likely to result from a number of factors including historical grazing practices, bank and riparian condition, the presence of carp in watercourses and changes to the natural flow regime, particularly from the presence of Burrendong Dam.

iii Flooding

In the event of extreme flooding, of a magnitude similar to the possible maximum flood, the Macquarie River is predicted to reach approximately 310 mAHD at the downstream reaches of Watercourse A (Wellington Council 2013). The project site is situated above 335 mAHD, meaning that the project lies above the upper limit of river flooding.

The flood extent of Wuuluman Creek up to the 1% AEP event is predicted to remain on the northern side of Goolma Road/Twelve Mile Road, situated away from the project area (Footprint 2017). There is no current flood information available for Watercourse A, B and C, however, these watercourses have relatively small catchments limited to the local topography.

iv Hydrogeology

The project area falls within the Lachlan Fold Belt geological structure. Bedrock within the structure consists of felsic volcanics, shales and sandstone fractured rocks which are overlain by colluvial deposits and shallow alluvium.

Two groundwater systems are present near the project area:

- a shallow system residing in the shallow colluvium and unconsolidated sediments; and
- a deeper system associated with the underlying fractured rock.

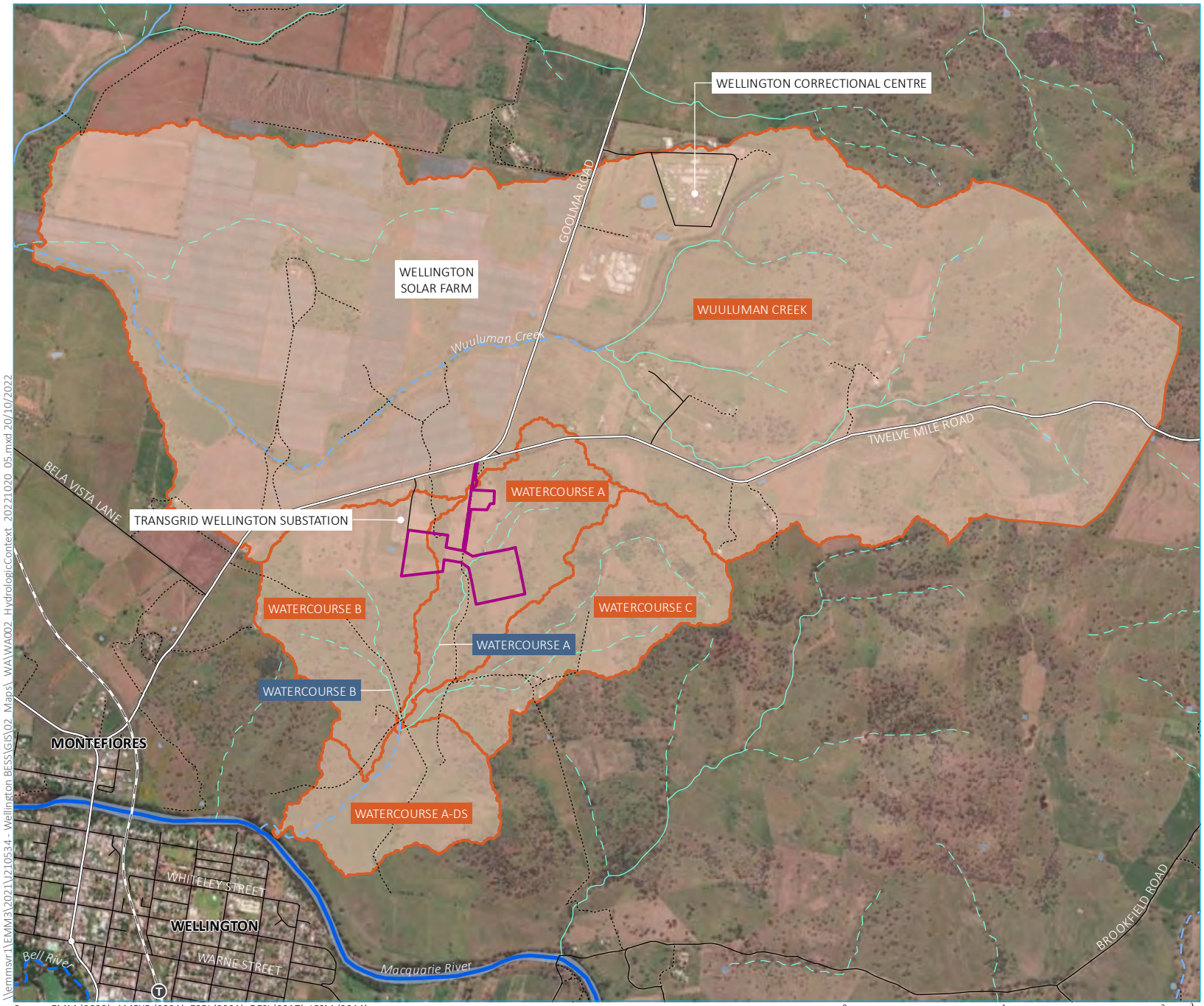
Groundwater levels within the fractured rock aquifer range from approximately 10–30 metres Below Ground Level (mBGL) near the project area. Levels within the colluvium/alluvium are likely to vary depending on the depth to bedrock. Flow direction of both systems is expected to be southerly toward the Macquarie River.

The Wellington Caves System is a high priority listed groundwater dependent ecosystem (GDE). It is located approximately 7.5 km south of the project and is highly unlikely to be impacted through construction or operation of the project.

There are several low potential terrestrial GDE's surrounding the site, including:

- Eucalyptus albens/Acacia decora, Acacia implexa, Acacia deanei subsp. paucijuga/Themeda austra; and
- Maireana microphylla, Pimelea neo-anglica, Pimelea neo-anglica, Sclerolaena birchii/Dichanthium.

These GDEs are mapped at the southern extent of the project area near the substation and BESS compound. Low potential terrestrial GDEs are likely to be opportunistically dependant on groundwater. No aquatic GDEs are present in the project area.



\\emmsvr1\EMM3\2021\I210534 - Wellington BESS\GIS\02 Maps\ WA\WA002 HydrologicContext 20221020 05.mxd 20/10/2022

Source: EMM (2022); AMPYR (2021); ESRI (2021); DFSI (2017); ICSM (2014)

Hydrologic context

Wellington Battery Energy Storage System
Environmental impact assessment
Figure 6.22

EMM
creating opportunities

6.10.3 Potential impacts

i Water quality

a Construction

The primary risk to water quality during construction will occur as a result of ground disturbance during earthworks and other site activities, including material handling, installation of battery infrastructure and surrounding areas, new buildings, new substation, trenching for services and grading for new access roads. There is potential that these works will lead to exposure of soils and increase the potential risk of erosion and mobilisation of sediment into receiving watercourses.

Contamination of surface water could occur through leaks and spills such as fuel, lubricants, herbicides and other chemicals used to support construction activities.

Potential risks to water quality during construction are considered minor and manageable with implementation of temporary water and soil management measures (refer Section 6.10.4).

b Operation

There is potential for an increase in stormwater pollutant loads into the receiving environment during operation. Pollutants of concern include gross pollutants (litter and small vegetation/debris), sediment (in the form of increased TSS loads/concentrations) and nutrients (in the form of increased TN and TP loads/concentrations). For the substation area, pollutants and contaminants of concern would also likely include hydrocarbons and oil/grease.

The water management approach (as described in Section 5.2.2 of the WA) will function with the objective of ensuring that relevant pollutant load reduction targets are met, and that specific water quality risks associated with the substation area are addressed. On this basis, potential adverse residual impacts to water quality discharging from the site are not anticipated.

ii Water quantity

a Construction

During construction there is the potential for a temporary increase in site runoff as a result of clearing, earthworks, compaction of soils and installation of impervious surfaces, leading to additional runoff leaving the project site and impacting downstream properties and receptors.

The potential impacts to site runoff volumes and rates are considered minor and manageable with implementation of temporary water and soil management measures (refer Section 6.10.4).

b Operation

Site runoff potential for the catchment contributing to Watercourse A is likely to increase permanently as a portion of the previous grassed areas will be replaced with impervious hardstand areas (associated with BESS compound and substation areas) and other areas with higher imperviousness than existing grass cover (eg gravel cover of access roads and areas surrounding BESS infrastructure).

The increase in runoff potential will be mitigated through the water management approach (as described in Section 5.2.2 of the Water Assessment). The approach has the objective of ensuring that peak flow rates are not increased for events up to and including the 1% Annual Exceedance Probability (AEP) event. On this basis, potential operational phase impacts to peak flow rates discharging from the site are not anticipated.

iii Flood impacts

The only potential flood impact mechanism for the project site is from local flooding within Watercourse A. Impacts associated with Watercourse A flooding is expected to be localised to the site and immediate surrounds and are not expected to extend to offsite properties.

The flood potential of Watercourse A will be considered during detailed design to inform construction planning and the final design of permanent infrastructure to ensure the adequate protection of sensitive infrastructure.

iv Groundwater impacts

Excavation during construction expected to be less than 10 m and therefore unlikely to intercept the fractured rock lithology where neighbouring bores are screened.

Infiltration of stormwater runoff to the underlying soils and groundwater system is likely to occur via the water management system, however, the residual water quality of stormwater will be limited to conventional treated stormwater.

Accordingly, the project is not expected to have any adverse impacts on groundwater levels or quality.

v Licencing

Stormwater reuse is likely to be undertaken during construction, in line with best practice water management. Water extraction (or water take) from disturbed areas is excluded works under the Water Management (General) Regulation 2018. No other surface water take or capture is proposed. Accordingly, the project is not expected to have any requirements for surface water licensing.

Groundwater may be sourced from an existing landholder bore, subject to approvals, for construction uses and to supplement rainwater, where required, for irrigation of the visual screening during operation. To use water from the existing bore (or a new bore), a Water Access Licence (WAL) will need to be obtained either by entering the water trading market or via a Controlled Allocation Order (CAO). The number of shares available for the Lachlan Fold Belt MDB Groundwater source in the 2021 CAO was 5,125, demonstrating sufficient depth in the market.

vi Waterfront land

Works will be required on waterfront land (as mapped by the Water Management (General) Regulation 2018 hydroline dataset) associated with Watercourse A. Whilst a Controlled Activity Approval (CAA) is not required for the project due to its SSD designation, relevant guidelines have been considered in the development of the project description and assessment with a view to minimising potential impacts to the riparian corridor. It is noted that for the current conceptual site layout, the substation location shows a minor encroachment on the Inner 50% of the Vegetated Riparian Zone (VRZ). The final siting of the substation infrastructure will be determined during detailed design, where it will be sited to avoid the Inner 50% of the VRZ, where possible.

6.10.4 Management measures

A summary of the proposed surface water mitigation and management measures is provided in Table 6.41.

Table 6.41 Proposed water related mitigation and management measures

Ref.	Aspect	Proposed mitigation measures
General		
SW01	Watercourses and riparian corridors	Final project layout to be adjusted, where possible, during detailed design to avoid encroachment into the inner 50% of the vegetated riparian zone along Watercourse A. This should apply to permanent works as well as any temporary works required during construction.
SW02	Watercourses and riparian corridors	Detailed design to develop a bed level or culvert waterway crossing design for Watercourse A that is consistent with guidance in DoPI (2012).
Construction		
SW03	Water quality	Implementation of erosion and sediment control measures and site rehabilitation and revegetation in accordance with best practice. The LSEA (EMM 2020) describes a range of proposed measures for adoption. Proposed measures will be considered further and formalised as part of detailed design and documented in the CEMP. Access tracks to incorporate appropriate water quality treatment measures such as vegetated swales to minimise the opportunity of dirty water leaving the site and entering waterways. Implementation of procedures for hazardous material storage and spill management to be prepared and documented within the CEMP.
SW04	Flooding	Construction site planning at detailed design stage to: • consider flood risk and locate temporary site works, compounds, storage areas and plant/equipment away from flood prone areas where practicable; • ensure connectivity of temporary drainage to Watercourse A and retention of overland flow paths from the site; and • maintain riparian corridor setbacks along watercourses.
SW05	Water licencing	A water supply work approval is to be obtained to convert the existing landholder bore to a water supply bore and a WAL is to be obtained for the required construction water take, should onsite groundwater sources be utilised to supplement other water sources.
Operation		
SW06	Watercourses and riparian corridors	Monitoring of watercourse and riparian corridor condition for Watercourse A immediately adjacent to the project will be undertaken at an appropriate frequency, with maintenance undertaken as required to minimise scouring and erosion in particular in the vicinity of the new watercourse crossing.
SW07	Water quality	Continuation of erosion and sediment control and site rehabilitation and revegetation measures as appropriate and monitoring and maintenance of ground cover vegetation and other stabilised surfaces throughout operation to limit erosion and transport of sediment to watercourses. The LSEA (EMM 2020) describes a range of proposed measures for adoption. Proposed measures will be considered further and formalised as part of detailed design and documented in the OEMP. Implementation of procedures for hazardous material storage and spill management to be prepared and documented within the OEMP.

Table 6.41 Proposed water related mitigation and management measures

Ref.	Aspect	Proposed mitigation measures
SW08	Flooding	Detailed design of project to minimise potential for offsite flooding impacts up to and including 1% AEP event by: • ensuring finished ground levels are constructed at-grade and not materially higher than existing levels, in particular along potential hydraulic controls that could be formed by the proposed internal access roads; • maintaining connectivity of internal stormwater drainage to Watercourse A and retention of overland flow paths from the site; • incorporation of a detention function for the site water management basin, to maintain pre-developed storm flows to existing conditions up to the 1% AEP event; and • maintaining riparian corridor setbacks along watercourses. Flood emergency management protocols and procedures to be developed and documented in a FERP (or equivalent).
SW09	Water licencing	The WAL obtained for the required construction water take, will also be required to cover nominal water use for potential irrigation of the visual screening during operation.

6.11 Other impacts

6.11.1 Air quality

The construction phase of the project has the greatest potential for air pollutant emissions from activities such as bulk earthworks, land clearing and the movement of vehicles along unpaved roads. Sources of operational phase air pollutant emissions from the project will be negligible and are not considered further.

An assessment of the dust impacts associated with the construction of the project was undertaken in accordance with the *Guidance on the Assessment of Dust from Demolition and Construction (*Air Quality Management in the United Kingdom 2014).

The main air pollution and amenity issues[2] at construction sites are:

- annoyance due to dust deposition (soiling of surfaces) and visible dust plumes;
- elevated concentrations of airborne particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}) due to dust-generating activities; and
- exhaust emissions from diesel-powered construction equipment[3].

Dust emissions can occur during the preparation of the land (eg demolition and earthmoving) and during construction itself. They can vary substantially from day to day depending on the level of activity, the specific operations being undertaken, and the weather conditions.

2 There are other potential impacts, such as the release of heavy metals, asbestos fibres or other pollutants during the demolition of certain buildings. These issues need to be considered on a site by site basis (IAQM 2014).

3 Exhaust emissions from on-site plant and site traffic are unlikely to have a significant impact on local air quality, and in the majority of cases they will not need to be quantitatively assessed (IAQM 2014).

The risk of dust impacts from a construction site is related to the following:

- the nature of the activities being undertaken;
- the duration of the activities;
- the size of the site;
- the meteorological conditions (wind speed, direction and rainfall), as adverse impacts are more likely to occur downwind of the site and during drier periods;
- the proximity of receptors to the activities;
- the sensitivity of the receptors to dust; and
- the adequacy of the mitigation measures applied to reduce or eliminate dust.

Any effects of construction on air pollution and amenity would generally be temporary and relatively short-lived. Moreover, mitigation should be straightforward, as most of the necessary measures are routinely employed as 'good practice' on construction sites. The IAQM approach therefore aims to identify risks and to recommend appropriate mitigation measures.

i Potential impacts

In the IAQM assessment procedure, activities at construction sites are divided into four types:

- Demolition, which is any activity that involves the removal of existing structures.
- Earthworks, which covers the processes of soil stripping, ground levelling, excavation and landscaping. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling.
- Construction, which is any activity that involves the provision of new structures, modification or refurbishment.
- Track-out, which involves the transport of dust and dirt by vehicles from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

The assessment method considers three separate dust impacts:

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM_{10}; and
- harm to ecological receptors.

The procedure for assessing risk is shown in Figure 6.23. Professional judgement is required in some cases, and where justification cannot be given, a precautionary approach is adopted. The assessment is used to define appropriate mitigation measures to ensure that there will be no significant residual effects.

The key steps in the procedure are as follows:

- Step 1 – a screening requirement for a detailed assessment based on the proximity of surrounding receptors;
- Step 2 – an assessment of the risk of dust impacts and the sensitivity of surrounding receptors;

- Step 3 – a determination of site-specific mitigation;
- Step 4 – consideration of residual effects and significance; and
- Step 5 – an assessment report (this document).

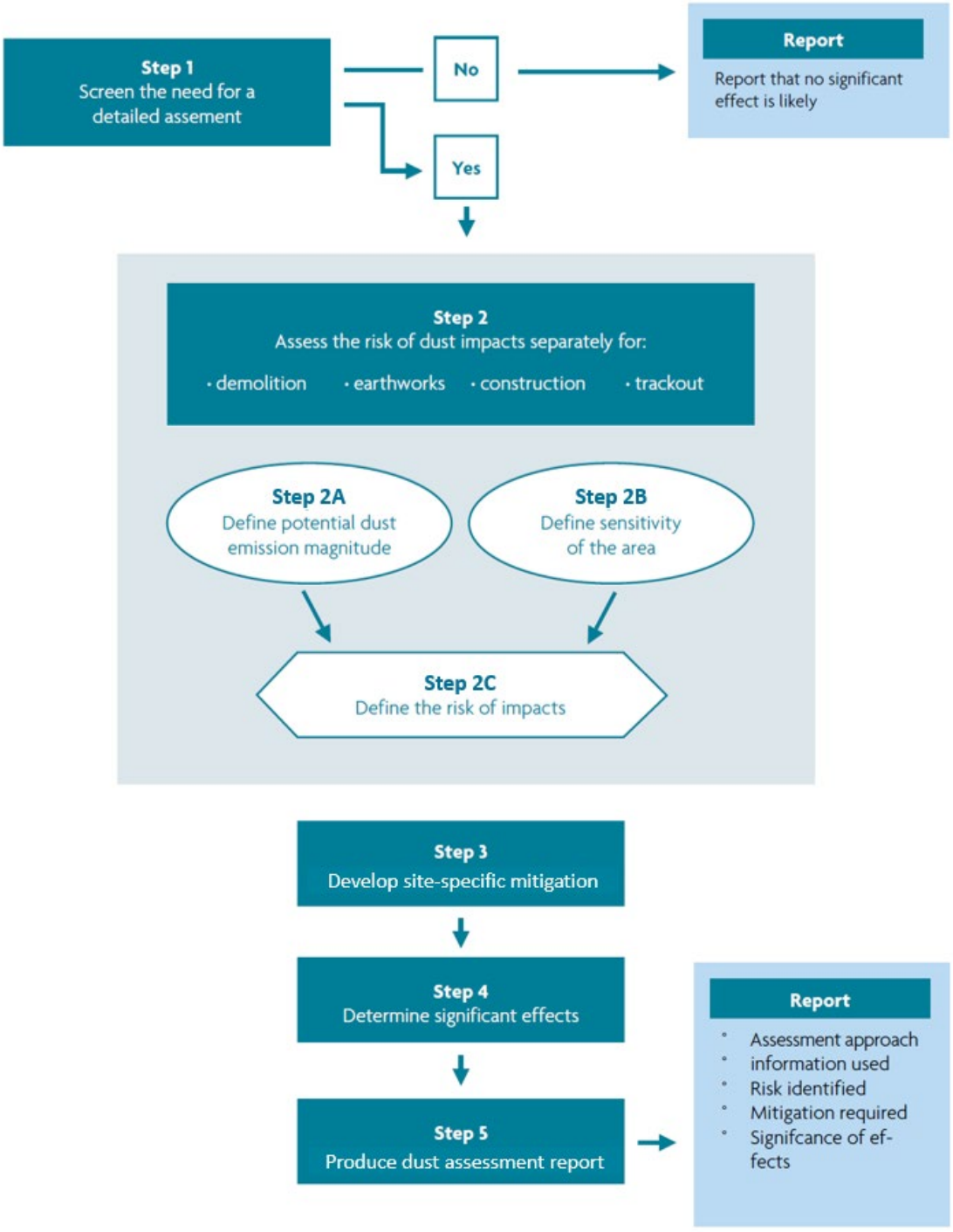


Figure 6.23 Procedure for the assessment of construction dust

Under Step 1, the IAQM guidance specifies that a detailed construction dust assessment should be undertaken if:

- a human receptor[4] is located within 350 m of the site boundary;
- an ecological receptor[5] is located within 50 m of the site boundary; or
- a human/ecological receptor is within 50 m of a route used by construction vehicles up to 500 m from a site entrance.

The project area and locations of nearby receptors are shown in Figure 1.2.

The results of Step 1 are summarised in Table 6.42.

No human receptors were identified within 350 m of the boundary of the construction footprint and no sensitive ecological receptors were identified within 50 m of the boundary. Consequently, the proposed construction activities have not triggered the requirement for a detailed assessment of construction impacts associated with the project. Therefore, the risk for air quality impacts associated with the construction of the project is considered to be low.

Table 6.42 Results of step 1

Human receptors		Ecological receptors		Detailed assessment required
Within 350 m of site boundary	**Within 50 m of route used by construction vehicles**	**Within 50 m of site boundary**	**Within 50 m of route used by construction vehicles**	
No	No	No	No	No

ii Management measures

Measures have been recommended for the construction of the project and are summarised in Table 6.43. A CEMP will be prepared for the project construction phase which will outline measures to manage dust.

[4] A 'human receptor' refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to air quality standards and goals. In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as museums, galleries, vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations.

[5] An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (eg on foraging habitats).

Table 6.43 Air quality management and mitigation measures

Impact/risk	ID	Measure	Timing
Reporting and record keeping	AQ01	Develop appropriate communications to notify the potentially impacted residences of the project (duration, types of works, etc), relevant contact details for environmental complaints reporting.	Pre-construction
Reporting and record keeping	AQ02	A complaints logbook will be maintained throughout the construction phase which should include any complaints related to dust; where a dust complaint is received, the response actions should be detailed in the logbook.	Construction
Reporting and record keeping	AQ03	Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook.	Construction
Reporting and record keeping	AQO4	Carry out regular site inspections, record inspection results, and make the logbook available for review as requested.	Construction
Dust	AQ05	Erect shade cloth barriers to site fences around potentially dusty activities such as trench excavations and material stockpiles where practicable.	Construction
Dust	AQ06	Keep site fencing and barriers clean using wet methods.	Construction
Dust	AQ07	Deploy water carts to ensure that exposed areas and topsoils/subsoil are kept moist.	Construction
Dust	AQ08	Provide an adequate water supply on the construction site for effective dust/particulate matter suppression/mitigation.	Construction
Dust	AQ09	Modify working practices by limiting activity during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the site.	Construction
Dust	AQ10	Minimise drop heights from loading or handling equipment.	Construction
Site inspections – dust monitoring	AQ11	Undertaking daily on-site and off-site inspections, where receptors are nearby, to monitor dust. The inspection results should be recorded in a specific log. Inspection should include regular dust soiling checks of surfaces such as street furniture and cars.	Construction
Site inspections – dust monitoring	AQ12	At the commencement of each day's activities, the local meteorological forecast should be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures should be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts should be discussed at the morning toolbox meeting.	Construction

Table 6.43 Air quality management and mitigation measures

Impact/risk	ID	Measure	Timing
Site inspections – dust monitoring	AQ13	Increasing the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the site boundary, increased intensity or additional mitigation measures should be deployed.	Construction
Site inspections – dust monitoring	AQ14	Undertaking daily on-site and off-site inspections, where receptors are nearby, to monitor dust. The inspection results should be recorded in a specific log. Inspection should include regular dust soiling checks of surfaces such as street furniture and cars.	Construction
Site inspections – dust monitoring	AQ15	At the commencement of each day's activities, the local meteorological forecast should be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures should be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts should be discussed at the morning toolbox meeting.	Construction
Site inspections – dust monitoring	AQ16	Increasing the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the site boundary, increased intensity or additional mitigation measures should be deployed.	Construction
Speed limit	AQ17	Impose a maximum-speed-limit of 20 km/h on all internal roads and work areas during construction.	Construction
Vehicle fuel combustion emissions	AQ18	Ensure proper maintenance and tuning of all equipment engines.	Construction
Clearing	AQ19	Limit the extent of clearing of vegetation and topsoil to the designated footprint required for construction and appropriate staging of any clearing.	Construction
Exposed soils	AQ20	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Construction
Materials handling	AQ21	Minimise drop heights from loading or handling equipment.	Construction
Track out from vehicles	AQ22	Access gates to be located at least 10 m from receptors where possible.	Construction
Track out from vehicles	AQ23	Use water-assisted dust sweeper(s), to remove, as necessary, any material tracked out of the site onto public roads.	Construction
Track out from vehicles	AQ24	Avoid dry sweeping of large areas.	Construction

Table 6.43 Air quality management and mitigation measures

Impact/risk	ID	Measure	Timing
Track out from vehicles	AQ25	Ensure vehicle loads entering and leaving sites are covered to prevent escape of materials during transport.	Construction
Track out from vehicles	AQ26	Trips and trip distances should be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips.	Construction

6.11.2 Contamination

The project area has been occupied since the 1990s with the land used intermittently for grazing.

Historic ownership does not suggest a history of contaminating activities and aerial imagery confirms the land has remained largely unchanged since 1959 (a review of historic aerial photography is presented in Table 6.44).

Table 6.44 Aerial photographs

Date	Source	Interpretation
1959	Department of Customer Service	**Onsite**: The site appears to be cleared of vegetation. A driveway access appears to have been developed in a north to south alignment along the boundary of the site which extends beyond the site. **Offsite**: Goolma Road and Twelve Mile Road are formed.
1969	Department of Customer Service	**Onsite**: There are no significant changes to the site. **Offsite**: There are no significant changes offsite.
1988	Department of Customer Service	**Onsite**: There are no significant changes to the site. **Offsite:** Vegetation clearing has occurred over most of the landholding to the west and substation appears to have been developed.
1995	Department of Customer Service	**Onsite**: There are no significant changes to the site. Transmission lines appear to transect the site in an east-west alignment. **Offsite**: Two transmission towers appear to have been developed to support transmission lines. A water management dam appears to have been developed.
2007	Google Inc.	**Onsite**: There are no significant changes to the site. The driveway access appears to have been improved and slightly realigned. **Offsite:** Residential development is visible to the north-east of the site. A stockpiling area appears to have been established to the west of the substation site. The substation appears to have been further developed.
2012	Google Inc.	**Onsite:** There are no significant changes to the site. **Offsite:** There are no significant changes offsite.
2019	Google Inc.	**Onsite**: There are no significant changes to the site. **Offsite:** There are no significant changes offsite.

Table 6.44 Aerial photographs

Date	Source	Interpretation
2021	Google Inc.	**Onsite:** There are no significant changes to the site. **Offsite:** Solar farm development appears to occur over most of the landholding to the north, opposite Goolma Road. Areas of the landholding have been improved for cropping

A desktop review of contamination registers was undertaken. This search identifies records within Lot 32 DP 622471 and Lot 1 DP 1226751 and within a 1,000 m radius (buffer area). The findings are summarised in Table 6.45.

Table 6.45 Desktop contamination assessment

Register	Description	Results	Description	Distance from site boundary
NSW EPA contaminated land: record of notices	NSW EPA's Contaminated Land Public Record register (under Section 58 of the CLM Act) lists sites for which the EPA has issued regulatory notices under the CLM Act. The register includes the details of current and former regulatory notices issued.	No records for the site or buffer		
NSW EPA contaminated land: sites notified	NSW EPA's register of contaminated sites notified to the EPA under Section 60 of the CLM Act, provides an indication of the management status of that particular site. Under Section 60 of the CLM Act, properties must be registered with EPA if there is reason to suspect the land is contaminated, and one or more of the notification triggers in the duty to report guidelines exist at the site. Upon receipt of a Section 60 notification, the EPA assesses the contamination status of the site to determine whether the contamination is significant enough to warrant regulation by the EPA.	No records for the site or buffer		
NSW EPA: former gasworks register	The NSW EPA maintains a register of former gasworks as the operation of gasworks has left a legacy of soil and groundwater contamination. The major contaminants include tars, oils, hydrocarbon sludges, spent oxide wastes, ash and ammoniacal recovery wastes.	No records for the site or buffer		
EPA PFAS (per- and poly-fluoroalkyl substances) Investigation Program	EPA state-wide PFAS investigation program to identify the use and impacts of legacy PFAS. These are a group of manufactured chemicals that are fire retardant, waterproof and stain-resistant that are very stable and can bioaccumulate.	1 record	Wellington Fire and Rescue NSW at 47 Falls Road, Wellington. PFAS was detected in low quantities in soil, however residents of were advised not to take any additional precautions to limit their exposure to PFAS. PFAS investigations at Wellington have now concluded.	510 m south-west

Table 6.45 Desktop contamination assessment

Register	Description	Results	Description	Distance from site boundary
UPSS Environmentally Sensitive Zones	Environmentally sensitive areas (eg water course or protected area) which would be affected by the operation of Underground Petroleum Storage Systems (UPSS).	1 record	UPSS Environmentally Sensitive Zone	The site is within the zone
EPA Licensed Activities	Licensed activities regulated by the EPA under the POEO Act.	1 record	Wellington Water Filtration Plant at 53 Falls Road, Wellington	350 m south-west
EPA Delicensed and Former Licensed Activities	Former Licensed activities under POEO Act, now revoked or surrendered.	1 record	Wellington Substation at 6909 Goolma Rd, Wuuluman	Within Lot 1226751

i Potential impacts

There is no evidence to suggest potential contamination at the project area. The project area has been primarily used intermittently for grazing; there has been no development on the land, or animal dips or stockyards, waste dumps or fuel storage. There is no history of other land-use such as industrial and chemical works or storages; or land filling activities which are activities commonly associated with contamination at the site or in the surrounding area.

Potentially contaminated sites and uses that have been identified are located at distance from the site. The likelihood of contamination resulting from this activity is considered to be low given the considerable distance and because groundwater flow direction is expected to follow a muted reflection of topography, ie towards Macquarie River, therefore, if there is any potential historic contamination it will not have migrated towards the project area.

Field sampling and laboratory testing to confirm the absence of contamination is not warranted.

Activities at the site have the potential to introduce contamination to the receiving environment. These risks include:

- spills or leaks of fuels, oils, etc from vehicles used in the construction of the site; and
- spills or unplanned releases of materials that are considered contaminants. This can include fuels or hazardous chemicals, such as hydraulic fluids or herbicides and potential spills at storage locations, use locations, or during transport;

ii Management measures

The management and mitigation measures are summarised below in in Table 6.46.

Table 6.46 Contamination management and mitigation measures

Potential impact	ID	Measure	Timing
Contamination	CON01	An unexpected finds protocol will be developed and contained within the CEMP to include procedures to identify potentially contaminated land, such as: • the observation of discolouration or staining of soils; • visible signs of plant stress, presence of drums or other waste material; and • stockpiles or fill material, or odours. Where signs of contamination are identified, whether from known or unexpected sources, construction work within the affected areas would cease until a contamination assessment was undertaken to advise the need for further investigation or remediation.	Construction
Handling and storing waste	CON02	Procedures for handling and storing waste be developed and implemented and contained within the CEMP, including detail on the handling of potentially or known contaminated material and protocols for waste classification and disposal.	Duration of project

6.11.3 Waste

Construction and operation of the project will generate waste from a variety of sources and activities, including:

- excess spoil through site clearance activities and earthworks;
- vegetation from the removal of shrubs and trees;
- packing materials associated with items and materials delivered to the site, such as pallets, crates, cartons, plastics and wrapping materials;
- wastes produced from the maintenance of construction equipment and machinery and operational plant, including liquid wastes from cleaning, repairing and maintenance;
- general refuse from the control and office building (eg paper and food wastes); and
- sewage wastes generated through the use of worker's facilities (portable toilets during construction and the permanent ablutions facility). These would be serviced as needed and waste would be disposed of off-site at processing location.

The life of the BESS units is approximately 20 years, during this time certain components of the BESS or substation may require maintenance and/or replacement.

Waste will be managed in accordance with the waste hierarchy of priorities. The types of waste generated by construction and operation of the project and the proposed methods of management and disposal are detailed in Table 6.47.

Table 6.47 Waste streams and proposed management

Waste type	Description	Proposed management
Construction		
Excess construction material and packaging	Paper, timber, drums, waste concrete, scrap metal, plastic wrapping plasterboard and cables	Remove from site either return to suppliers or recycling facilities where feasible.
Excavated material	Soil, clay, rocks excavated during earthworks	Cut and fill to be reused on-site where required or practical.
General refuse	Paper, carboard, plastics, glass, food scraps and other putrescibles	Offsite recycling and disposal.
Green waste	Vegetation clearing (tree and shrubs)	Separated, some chipped and stored on-site for landscaping, remainder to off-site recycling. Stumps and large trees would be sent to landfill.
Hazardous and chemical materials	Oils, fuels and liquids and required for construction plant and vehicles.	Remove from site as required and disposal at an appropriately licensed waste/recycling facility.
Sewage from staff amenities	On site portable facilities	Remove from site as required and disposal at an appropriately licensed waste/recycling facility.
Operation		
Batteries, substation components and cabling	Lithium-ion batteries and battery components replacement / maintenance Substation part component Cabling replacement	Returned to the supplier for repurposing or appropriate disposal at a an appropriately licensed waste/recycling facility.
General refuse (office and control building)	Paper, carboard, plastics, glass, food scraps and other putrescibles.	Offsite recycling and disposal.
Sewage from staff amenities	Septic tank	Pump out as required and disposal at an appropriately licensed waste/recycling facility.

i Potential impacts

The mismanagement of waste generated by the project has the potential to result in the following impacts during construction:

- excessive materials being directed to landfill due to inadequate collection, reuse, and recycling;
- impacts on human health resulting associated with various types of waste being generated and stored onsite, with the potential for misclassification or mishandling resulting in potential cross contamination; and
- environmental impacts from the incorrect storage, classification, transport and disposal of waste.

Management measures will be implemented to reduce the risk of the above impacts.

Waste generated by the operation of the project will be limited and be mostly from maintenance and minor repair works.

ii Management measures

The following general mitigation measures will be implemented.

Table 6.48 Waste management and mitigation measures

Potential impact	ID	Measure	Timing
Waste classification	W01	All waste will be assessed, classified, managed, and disposed of in accordance with the *Waste Classification Guidelines* (NSW EPA 2014).	Construction
Reporting and record keeping	W02	A construction waste and resource management plan will be developed and contained within the CEMP to outline appropriate management procedures and include, but not be limited to: • identify waste types and volumes that are likely to be generated by the project; • adherence to the waste minimisation hierarchy principles of avoid/reduce/reuse/recycle/dispose; • waste management procedures to manage the handling and disposal of waste, including unsuitable material or unexpected waste volumes; and • identification of reporting requirements and procedures for tracking of waste types and quantities.	Pre-construction

6.12 Cumulative impacts

Development in vicinity of the project has the potential to generate cumulative impacts with the project. An assessment has been completed with reference to the DPE's Cumulative Impact Assessment Guidelines (DPIE 2021b). The assessment has included consideration of:

- Incremental impacts – impacts of the project to the existing baseline condition of each relevant assessment matter (eg air quality, odour, noise, water, biodiversity, heritage, traffic, employment and workforce) – this is largely completed in relevant technical assessments and summarised in this section.
- Combined incremental assessment – combined effect of the different impacts of the project, summarised in this section.
- Issue-specific cumulative assessment – impacts of the project together with the impacts of other relevant future projects on specific issues within an identified area, summarised in this section.
- Combined cumulative assessment – considering the combined effect of the different cumulative impacts of the project with other relevant future projects on key matters in an identified area. This is largely qualitative and combined with the issue-specific cumulative assessment in this section. The qualitative nature relates to a range of uncertainties including:
    - The level of detail available for future projects – often future projects are at early stages of the planning process and limited information is available regarding the nature, timing and potential impacts of such projects.

- The likelihood that those projects will proceed – while many projects will gain approval, some may not, and some projects may never proceed despite gaining approval.

- The uncertainty of timing of future projects – while they may proceed at some point in the future, the timing is unknown.

6.12.1 Incremental impacts

Existing and approved developments within the local area, in particular, relating to the adjacent TransGrid Wellington Substation and nearby Wellington solar farm, Wellington North Solar Farm and Uungula Wind Farm, have been considered in the cumulative assessments of each of the technical assessments for visual, noise, traffic and social aspects. The impacts from existing developments have been assumed as part of the baseline conditions, and the incremental impacts of the project have been considered to identify the change in baseline. Cumulative impacts with other existing development, including those contributing to visual impacts to the landscape, generation of noise that contributes to background noise levels, use of transport routes by local traffic and nearby developments, and social impacts and benefits associated with other development in the local area have all been considered.

6.12.2 Other state significant projects

SEARs for the project specifically request the assessment of cumulative impacts with the Wellington Solar Farm, Wellington North Solar Farm and Uungula Wind Farm.

There are ten state significant projects, all SSD, recently approved or proposed in the local area identified through DPE's Major Projects Planning Portal. A radius of approximately 30 km from the project has been used to identify future projects of relevance. These projects are listed in Section 2.7 in ascending distance to the project. These have been identified as projects for consideration of cumulative impacts. Of the ten SSD projects within 30 km of the project:

- all are within the Dubbo Regional LGA;

- six are approved and three (Wellington South Solar Farm, Bodangora Wind Farm, and Suntop Solar Far) are either complete or are near completion); and

- two have construction programs with potential to overlap with the project.

The greatest potential for cumulative impacts of future projects and the project are related to:

- operation of the Wellington South Solar Farm, which has the potential for cumulative noise and visual impacts with the project;

- construction of the Wellington North Solar Farm, which has the potential for the construction period to overlap with the project, and have substantial workforce requirements that may draw construction workers from the same region; and

- construction of the Uungula Wind Farm, which has the potential for the construction period to overlap with the project, have substantial workforce requirements that may draw construction workers from the same region, and including associated construction and upgrades to the intersection of Goolma Road/Twelve Mile Road and realignment and widening works along Goolma Road and Twelve Mile Road.

A summary of the identified potential cumulative impacts with future projects identified within 30 km of the project is provided in Table 6.49.

Table 6.49 Cumulative impacts with future projects identified within 30 km of the project on the DPE Major Projects Planning Portal

Project name and development type	Approximate distance to project	Status	Overlap with project and potential for cumulative impacts
Wellington South Solar Farm	650 m	• Construction largely completed. Operation is expected in 2022. • Project life of 30 years.	The project involves the construction and operation of a solar farm. There is some potential for cumulative impacts relating to operation, in particular noise and visual impacts given the combined proximity to nearby sensitive receivers. No cumulative impacts are likely for traffic during operation of the solar farm. There is no potential for cumulative impacts related to construction as the solar farm should be fully operational before construction of the project commences (May 2023).
Wellington North Solar Farm	4.5 km	• Construction to commence in 2022 and to be fully operational in 2024. • Project life of 30 years.	The project involves road upgrades to Goolma Road and the construction and operation of a solar farm directly north of the Wellington South Solar Farm. There is some potential for cumulative impacts related to construction if there is an overlap of solar farm construction with the project's construction period. The potential overlap period may be up to 18 months (ie the duration of the project construction). The construction workforce for the solar farm is approximately 250 people and has requirements for heavy and OSOM vehicle movements associated with the delivery of equipment and infrastructure. No significant impacts are likely for operation.
Maryvale Solar Farm	11 km	• Determination – 4 December 2019. • Project life of 30 years.	The project involves the construction and operation of a solar farm. There is no potential for cumulative impacts related to construction as the solar farm should be fully operational before construction of the project commences (May 2023). No cumulative impacts are likely for operation.
Uungula Wind Farm	13 km	• Construction to commence in 2022 and to be fully operational in 2027. • Project life of 30 years.	The project involves road upgrades to Twelve Mile Road and a realignment and upgrade to the Goolma Road/Twelve Mile Road intersection, along with the construction and operation of a wind farm. There is potential for cumulative impacts related to construction if there is an overlap of wind farm construction with the project's construction period. The potential overlap period may be up to 18 months (ie the duration of the project construction). The construction workforce for the solar farm is approximately 250 people and has requirements for heavy and OSOM vehicle movements associated with the delivery of equipment and infrastructure. No significant impacts are likely for operation.
Apsley Battery Energy Storage System	13 km	• EIS in preparation. • Project life of 30 years.	The project involves the construction and operation of a BESS. This future project is spatially distant from the project. There is no construction period specified. No cumulative impacts have been identified for this future project.

Table 6.49 Cumulative impacts with future projects identified within 30 km of the project on the DPE Major Projects Planning Portal

Project name and development type	Approximate distance to project	Status	Overlap with project and potential for cumulative impacts
Bodangora Wind Farm	15 km	• MOD 4 Determination – 22 December 2017. • Project life of 30 years.	None. As construction of the wind farm has been completed and there is no potential for cumulative impacts associated with the operation of the project.
Suntop Solar Farm	15 km	• Determination – 4 December 2018. • Project life of 30 years.	None. As construction of the solar farm has been completed and there is no potential for cumulative impacts associated with the operation of the project.
Suntop Stage 2 Solar Farm	15.5 km	• EIS preparation. • Project life of 30 years.	The project involves the construction and operation of a solar farm. This future project is spatially distant from the project. There is no construction period specified. No cumulative impacts have been identified for this future project.
Mumbil Solar Farm	20 km	• EIS in preparation. • Project life of 30 years.	The project involves the construction and operation of a solar farm. This future project is spatially distant from the project. There is no construction period specified. No cumulative impacts have been identified for this future project.
Burrendong Wind Farm	25 km	• EIS in preparation. • Project life of 30 years.	The project involves the construction and operation of a wind farm. This future project is spatially distant from the project. There is no construction period specified. No cumulative impacts have been identified for this future project.

6.12.3 Assessment of cumulative impacts

i Employment and workforce

The employment demands for the above future projects may cause potential impacts on the availability of skilled workforce in the local area, should construction periods overlap substantially. This may require additional workers to be sourced from outside the local and regional areas.

The potential of a non-resident and relocating workforce to service the concurrent developments may contribute to the cumulative impacts in the local area. This may result in impacts on the capacity and availability of local service providers, accommodation providers and increased traffic. However, potential cumulative benefits may also be associated with the high number of SSD projects in the local area, such as increased employment and economic opportunities for local businesses and suppliers.

Local construction and general labour workforce availability may also be impacted by these concurrent developments. This may result in a shortage of workers which would increase the need for drive-in-drive-out workers that would exacerbate pressures on accommodation and housing. However, there is potential for an increase in local job availability supported by a number of SSDs to drive industry growth in the local area and the region.

Alternatively, construction works associated with the project may be postponed until a workforce is available to build the project.

Construction of the project will contribute to the employment of up to 100 jobs during peak construction. Operation of the project will contribute to the employment of up to two people.

ii Amenity

Potential amenity impacts could arise from dust accumulating from an increase of truck movements, especially during construction phase, as well as noise caused by plant and equipment, operating and traffic generation, primarily related the Wellington Solar Farm project which is the closest nearby project.

The key assessment locations for the project with the potential to experience cumulative noise impacts are identified as R1–R4, R15 and R16 (refer Figure 6.6). The cumulative noise levels from the proposed project and contributions from the Wellington Solar Farm are predicted to satisfy the amenity noise goals for all sources, as shown in Table 6.3 of the NVIA (Appendix K).

Potential cumulative visual impacts can arise from the presence of similar projects that may have a low impact individually, but when viewed together, can have a significant visual impact on the landscape. As discussed in Section 2.7 other renewable energy projects in the local area, include:

- Wellington Solar Farm, operational and located 600 m from the project site;
- Bodangora Wind Farm, operational and located 10 km from the project site;
- Wellington North Solar Farm, approved and 3.2 km from the project site; and
- Maryvale Solar Farm, approved and 7.5 km from the project site.

The proposed BESS and associated upgrade work at the Wellington Substation is considered to have limited potential to increase the significance of cumulative visual impact with regard to existing infrastructure, including the existing adjacent Transgrid Wellington Substation infrastructure and multiple connecting transmission lines. Once constructed, the infrastructure associated with the project will look similar to the existing substation infrastructure.

Given this, the potential for cumulative visual impacts from project with other projects and surrounding operations are expected to be low.

iii Traffic and transport

The greatest potential for cumulative impacts of future projects and the project in relation to traffic are associated with:

- construction of the Wellington North Solar Farm (SSD 8895) and Uungula Wind Farm (SSD 6687), which have the potential to have construction periods that overlap with the project; and
- upgrades to the Goolma Road/Twelve Mile Road intersection and Twelve Mile Road access track.

These projects are expected to require increased heavy vehicle movements during construction. In particular it is expected that heavy and light vehicle movements would pass via the project site access, therefore there is potential for cumulative traffic impacts along Goolma Road.

The construction starts and end months/years of the future projects are not publicly available, there is also uncertainty on the current scheduled timing for the Goolma Road/Twelve Mile Road intersection upgrade.

The TIA (Appendix L) considered a worst-case scenario whereby peak construction traffic associated with each of these nearby developments were to occur simultaneously with that of the project. The assessment demonstrated that under this scenario, the capacity of the existing road network would be close to the limit of stable flow, however would remain within an acceptable level of service (LOS D) and would only be experienced for the period during which these peak construction periods for each project overlapped.

Potential cumulative impacts are likely if the peak construction periods of these projects overlap, and it is proposed that this be further considered in subsequent phases of the project as the construction timeframes for each of the projects becomes more certain. A range of mitigation measures are proposed as part of the project, including the implementation of a construction traffic management plan, which will incorporate adaptive management measures to ensure that potential cumulative impacts can be effectively managed and minimised as far as practical.

Construction of these SSD projects will also have cumulative positive benefits to the community in facilitating improvements to the operation and safety of the local road network as a result of the road and intersection upgrade works committed by each of the projects.

iv Services

As construction of the project only requires a small number of external contractors for a short period of time, contributions to any cumulative impacts (compared to other concurrent projects) during construction works is expected to be minimal.

The potential for the SSD projects in the local area to have overlapping construction phases may cause potential impacts on the availability of skilled workforce in the local area, and therefore hiring may be dictated by skill requirements/worker availability. This may require additional project workforce to be sourced from outside the local and regional areas. The potential of a non-resident and relocating workforce from the concurrent developments may contribute to the cumulative impacts in the local area.

Potential cumulative benefits may also be associated with the high number of SSD projects in the local area, such as increased employment and economic opportunities for local businesses and suppliers.

v Rental housing

In March 2019 – March 2020, the residential vacancy rate for the local area demonstrated a significant over-supply of rental housing. However, in June 2020 a substantial drop occurred, failing below the equilibrium level of 3.0% to 2.0%. This may signal to the impact of the COVID-19 pandemic to the affordability of the regional housing market which substantial decreased residential vacancy rates and increased median rental property prices due to migration from urban centres (Homelessness NSW 2021).

Increased demand for skilled workforce and trades skills more generally, may arise with the construction and operation of concurrent SSD projects. This may cause potential impacts on the availability of skilled workforce in the LGA, requiring additional project workforce to be sourced from outside the local and regional areas, which may increase demand on rental housing within the local and regional areas (further discussed in Section 6.7 and Appendix O).

This has significant potential consequences for persons currently at risk of financial hardship, housing instability and homelessness, particularly in the context of COVID-19, which has further contributed to increased rents and lower rental availability in regional areas of Australia due to migrations from urban centres to more regional and rural areas (Anglicare 2021). Commitments to local hiring, provision of training and apprenticeship opportunities for local workers, and partnership with local employment and training services reduce the need for outsourcing of workers.

7 Justification of the project

This chapter provides a justification and evaluation for the project as a whole having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development.

7.1 Summary

The transition from thermal generation (eg coal) to renewable generation (eg wind and solar) has radically altered the NEM and the need for energy storage to cater for the intermittent nature of renewable energy sources. The project will provide critically needed firming capacity to the grid while supporting a reliable and secure source of electricity to consumers and the local population. In operation, the Wellington BESS will be one of the largest in the state, capable of contributing up to 1,000 MWh of storage capacity in the NEM. The project will also provide benefits in the form of smoothing out energy spot prices and providing back-up power during network interruptions.

Development in the project in the proposed location will allow AMPYR and Shell to leverage its close proximity to the existing Wellington Substation, thereby minimising transmission line requirements and cost. Further, it will allow for the co-location of similar grid infrastructure, minimising land use conflict. The site proposed to be developed offers a location that is low-lying, substantially shielded by topography and vegetation, and substantially buffered from privately-owned land and sensitive uses.

The project is consistent with relevant Commonwealth, State and local strategic plans and polices, in particular the *NSW Electricity Infrastructure Roadmap* (DPIE 2020a) which identifies that by mid-2030, NSW could need up to 2.3 GW of storage throughout the network. The project will contribute to storage requirements by delivering a battery capable of providing a peak capacity of up to 500 MW that can be dispatched as required to meet demand.

Were this project not to proceed, the opportunity to provide additional firming capacity and reliability to the grid will not be realised. Due to the need to establish large-scale batteries in NSW, not proceeding with the project in its current location may encourage development of a BESS in a less favourable location, resulting in undesired outcomes (eg greater requirements for transmission line connection and costs to consumers).

The project will have both impacts and benefits on the surrounding natural and built environments. The impacts have been investigated, are not predicted to be significant and can be adequately managed through appropriate design, mitigation and management during construction and operation. On balance, it is recommended that the project should be approved.

7.2 Design development

The project has been designed to avoid and minimise impacts where reasonable and feasible. The principles of avoidance and minimisation were implemented through the siting of infrastructure which involved numerous technical specialists. Throughout the development of the project design, AMPYR and Shell have sought to optimise the project in a manner that considers the surrounding environment, avoids or minimises impacts at sensitive locations, and maintains existing natural features where present.

A range of alternatives were considered in the siting of the project. Section 2.8 details the reasons why the project location was selected and why it is regarded as the most appropriate and feasible option. In particular, the potential for noise impacts and visual impacts at nearby sensitive receivers was a key consideration for the proposed location of BESS infrastructure and associated upgrade works at the Wellington substation.

7.3 Strategic context

The project is supported by Commonwealth and State plans and policies as described in Chapter 2. Further, the project is proposed to be constructed on land with suitable land use zoning.

Regional and local strategic plans do not mention energy storage explicitly but references the need to increase renewable energy generation in the region. The project will support these goals and targets by facilitating greater penetration of renewable energy at times when renewable energy facilities in the region are not actively generating electricity (eg during night time or during periods of low wind).

7.4 Statutory compliance

In accordance with the EP&A Act, Clause 1.3 sets out the Objects of the Act. The consistency of the project with the objects of the Act is considered in Table 7.1.

Table 7.1 Objects of the EP&A Act

Objective	Consistency of the project
1. To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The project provides for grid firming and will otherwise support the penetration of renewable energy sources in the NEM. Technical specialists have been engaged to assess and report on the potential for the project to impact upon the natural and other resources of the state and local areas. The impacts have been summarised in Chapter 6.
2. To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	This EIS describes the economic, environmental and social context of the project and the potential impacts of it to allow informed consideration of these aspects in determining the application. The project provides energy storage and dispatchable firming to support renewable energy projects being developed in the region and throughout NSW.
3. To promote the orderly and economic use and development of land.	The orderly and economic use of land is best served by development that is permissible under the relevant planning regime and predominately in accordance with the prevailing planning controls. The project comprises a permissible development, which is consistent with the statutory and strategic planning controls and is in close proximity to similar land uses including the TransGrid substation and Wellington Solar Farm. As detailed in this EIS, the project will result in positive economic impacts, with appropriate mitigation measures and management strategies being proposed to reduce any adverse environmental and social impacts.
4. To promote delivery and maintenance of affordable housing.	Not applicable to the project.

Table 7.1 Objects of the EP&A Act

Objective	Consistency of the project
5. To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Wherever possible, direct impacts have been avoided and/or minimised through site selection and through design by minimising distances to the TransGrid substation and by avoiding impacts to riparian vegetation and woodland. The project will result in the following direct impacts: • clearing of up to 9.47 ha of native vegetation in the development boundary; • loss of fauna habitat associated with native and exotic vegetation clearing; and • increased fragmentation of vegetation. Wherever possible, direct impacts have been avoided and/or minimised through the design of the development boundary. Indirect impacts will be managed and mitigated through the implementation of the biodiversity management measures detailed in Section 6.1.4 and Appendix E. Residual impacts will be compensated through implementation of the biodiversity offset scheme (BOS). The potential impacts of the project on biodiversity have been addressed and summarised in Section 6.1.
6. To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The project will not impact upon cultural or built heritage values as described in Section 6.4.
7. To promote good design and amenity of the built environment.	Potential noise, air quality, and visual impacts on sensitive receivers and the broader community have been fully assessed and described in Sections 6.3, 6.9 and 6.11.1 respectively.
8. To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Over the life of the project, infrastructure will be maintained, or upgraded, to ensure safe and efficient operations. All construction associated with the project will be compliant with the Building Code of Australia and all other relevant statutory requirements.
9. To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	As outlined in this chapter, the project is subject to the provisions of Part 4 of the EP&A Act, and the Minister for Planning and Public Spaces or Independent Planning Commission (IPC) will be the consent authority. Despite this, Council, as the local government authority, has been regularly consulted throughout the planning phases of the project and preparation of this EIS (refer Chapter 5). As such, it is deemed that both local and State levels of government have been provided with sufficient opportunities to share in responsible environmental planning of the project.
10. To provide increased opportunity for community participation in environmental planning and assessment.	As described in Chapter 5, there have been a range of engagement activities to inform the community about the project and to seek community (and other stakeholders) feedback. This EIS provides further detailed information regarding the project and its potential impacts. It will be placed on public exhibition by DPE, and community members will be able to make formal submissions. A report will be prepared responding to these submissions.

7.5 Consideration of community views

Consultation conducted for the project is described in Chapter 5. Feedback from the community was limited but included both positive and negative views on a range of topics. Interest in the project primarily came from residents within the community of Wellington.

Some stakeholders recognised the benefits of the project as well as the project's role in the electricity grid. In particular, stakeholders acknowledged the project as a source of local employment, particularly during construction. Stakeholders were interested in understanding how the technology works and the benefits the project could deliver in the community.

Some concerns were raised by community stakeholders regarding how potential environmental impacts and hazards will be managed. These matters included the potential for electromagnetic fields, fire hazards, noise, and safety impacts.

Detail of community views and responses are included in Section 5.6 and were identified as part of the SIA field study and engagement conducted by EMM, AMPYR and Shell.

Stakeholder requests were responded to and further information was provided to address concerns of risks relating to noise and hazards impacts once determined.

7.6 Summary of project impacts

This EIS has considered the potential impacts associated with the project, as well as the need for the project and alternative development options. This section summarises the potential impacts and provides a justification for the project on environmental, economic and social grounds.

7.6.1 Environmental impacts

This EIS has assessed potential impacts to the biophysical environment which are summarised below:

- Physical impacts to biodiversity, heritage, land resources, and water:
    - Biodiversity impacts are associated with the loss of 9.47 ha of the White Box grassy woodland in the upper slopes of the NSW South Western Slopes Bioregion, a CEEC listed under the BC Act. This will result in the loss of 9.47 ha of native vegetation and associated habitat for fauna species. The project will result in the loss of up to seven hollow bearing trees. The BDAR predicts indirect impacts to a further 1.37 ha of native vegetation, associated habitat for fauna species and the White Box grassy woodland CEEC. Under the BAM, the project requires 27 ecosystem credits to offset impacts on native PCTs, 42 species credits for the Superb Parrot (*Polytelis swainsonii)* and 66 species credits for Key's Matchstick Grasshopper, which is assumed present in the BDAR and will be subject to further survey as part of the RtS phase of the project. The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The project is not expected to result in significant impacts to the Superb Parrot. A referral under the EPBC Act is not required, as the project is not considered to be a controlled action.
    - No impacts to Aboriginal cultural heritage or historic heritage are predicted.
    - Soil impacts are not predicted to be significant. The site subsoils have a high erosion potential, however if the recommended measures are implemented, then the erosion and subsequent sedimentation risk will be low with minimal residual impacts. At the end of the project design life, the site will be rehabilitated to a condition as near as practicable to the condition that existed prior to construction of the facility and in consultation with the landowner.

- Water related impacts, including groundwater and surface water are not predicted to be significant. The project is not expected to have any requirements for surface water licensing, with stormwater reuse likely to be undertaken during construction. Providing the existing landholder's bore is sufficient to supply water potentially required to supplement construction and operation, a water supply work approval (WA) will be required to change the approved usage of the bore from stock and domestic use to water supply use. The final siting of the BESS infrastructure will be determined during detailed design, to be sited to avoid impacts to waterfront land.

- Amenity impacts including noise and vibration, traffic and transport, and visual:

  - Construction noise levels from the project are predicted to exceed noise management levels (NMLs) at a number of assessment locations by a negligible level (1–2 dB). An exceedance of 6 dB above NML at R1 closest to the site is predicted in the absence of specific additional mitigation. Noise monitoring during construction will be considered to determine if actual construction noise levels are above NMLs. Subject to the measured level of exceedance, availability of feasible and reasonable noise mitigation and management measures will be determined.

  - Operational noise has been assessed under adverse weather conditions and considering the actual operational utilisation of the BESS. Noise mitigation measures have been included in the modelling following the outcome of preliminary noise modelling indicating noise exceedances. Following the implementation of all feasible and reasonable mitigation options, the modelling has demonstrated noise compliance can be achieved for all assessment locations during day and night NPfI assessment periods. During the evening assessment period the potential for a moderate exceedance of 5 dB was predicted for R1 whilst a negligible 1 dB exceedance was identified for R15. All feasible and reasonable mitigation has been considered for R15, and considering the predicted level is negligible (1dB) over the PNTL, no further mitigation is proposed.

  - To address the residual noise exceedance at R1, negotiations have been undertaken between the applicant and the landholder for treatment to the dwelling (upgraded glazing and where necessary alternative ventilation) to ensure equivalent internal noise levels are achieved (-10 dB or more) below the relevant external PNTL. A draft agreement was under consideration by R1 at the time of finalisation of the EIS for public exhibition.

  - No impacts from construction vibration on nearby residents is predicted.

  - Traffic impacts are not predicted to be significant. Traffic generation during the peak construction period vehicles will increase traffic on Goolma Road which would result in this road sections mid-block capacity LOS B to LOS D. However, this will only be during the unlikely scenario where peak construction activity overlaps with the nearby development traffic. The level of service will will return to the baseline traffic conditions once peak construction period is over. No material impacts are expected during operation of the project.

  - The project has been designed to integrate with the surrounding environment to minimise visual impacts. Visual impacts arising from the project are not anticipated to be significant and landscaping will be implemented. Only one nearby receptor will experience a moderate visual impact due to it having elevated views into the site.

  - Glint and glare impacts and light spill impacts are not anticipated.

- Hazards and risk associated with project:
    - Hazards and risks associated with the project are not predicted to be significant. Risks have been assessed through a PHA. The PHA included an assessment of all potential hazards and risks including but not limited to bushfires, spontaneous ignition, and electromagnetic fields. The PHA concluded there no significant offsite impacts predicted from the operation of the project.

7.6.2 Economic impacts

The project will provide long-term livelihood benefits during operation. It will smooth out energy spot prices and provide energy security and reliability.

Economic benefits will also be generated during construction. It will make contributions to the regional economy in the form of annual direct and indirect purchases. The construction phase of the project is expected to require up to 100 construction personnel, the majority of which are expected to be generated in the Dubbo/Wellington region where regional and local residents have the required skills and experience.

7.6.3 Social impacts

The project will provide direct benefits to NSW overall, through providing firming capacity to the NEM. The project will also directly benefit the local area and regional area of Dubbo LGA, as outlined in the SIA, as summarised in Section 6.7 of this EIS. While the project has potential negative impacts, it is considered that these can be managed to acceptably low levels.

Mitigation and management strategies have been proposed for each of the identified potential social impacts to minimise negative consequences and to maximise social benefits for the local community (refer Section 6.7.4).

7.6.4 Cumulative impacts

The project has potential for cumulative impacts with nearby development and future projects. Cumulative impacts have been addressed in Section 6.12.

7.6.5 Ecologically sustainable development

The principles of ecologically sustainable development (ESD) are outlined in Clause 193 of the EP&A Regulation and addressed in Table 7.2 below.

Table 7.2 Consideration of principles of ecologically sustainable development

Principle	Ecologically sustainable development principle	Evaluation of project impact against principle
Precautionary principle	The **precautionary principle**, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by – (iii) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and (ii) an assessment of the risk-weighted consequences of various options.	During the project planning phase and preparation of this EIS, experts in their respective fields have carefully considered environmental outcomes through the preparation of quantitative technical assessments, providing a high degree of certainty around the impacts that may arise from the project. The findings of the technical assessments are provided in Chapter 6. The project will be designed with regard to the applicable of the precautionary principle and in response to legislation, policies, and guidelines to ensure that it does not pose an unacceptable risk to human health or the environment. Management measures have been proposed for all potential environmental impacts. Taking these measures into account, it is considered that there would be no threat of serious or irreversible damage to the environment. Therefore, the project is consistent with the precautionary principle.
Social equity including inter-generational equity	**Inter-generational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	A range of mitigation measures are proposed that will minimise the impacts of the project during construction and operation. The project will improve the penetration of renewable energy by storing energy in the NEM. This will support a transition away from fossil fuel (coal and gas) generation and contribute to a net reduction in greenhouse gas emissions. After the end of the project's operational life, infrastructure at the site will either be replaced/upgraded or decommissioned and removed from the site. After decommissioning, the site will be rehabilitated and likely return to its previous use (cropping/grazing). Given the above, it is considered that the project supports inter-generational equity.
Conservation of biological diversity and maintenance of ecological integrity	**Conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.	The conservation of biological diversity and ecological integrity was a fundamental consideration in the development of the project. The BDAR was prepared to assess potential impacts of the project (Section 6.1). Direct impacts to 9.47 ha of native vegetation or habitat for threatened species will occur as a result of the project. The project has been sited to minimise impact to biodiversity values where possible.

Table 7.2 Consideration of principles of ecologically sustainable development

Principle	Ecologically sustainable development principle	Evaluation of project impact against principle
Improved valuation and pricing of environmental resources	**Improved valuation, pricing and incentive mechanisms**, namely, that environmental factors should be included in the valuation of assets and services, such as— (iii) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement; (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and (iii) established environmental goals should be pursued in the most cost effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	Project benefits are considered to outweigh the costs. The project will generate up to 100 jobs during construction and will continue to provide economic benefits to the local community through a smoothing in energy spot prices. The project will also improve the penetration of renewable energy in the grid, supporting a transition away from fossil fuel (coal and gas) generation, thereby contributing to a net reduction in greenhouse gas emissions. AMPYR and Shell accept the financial costs associated with all the measures required for the project to avoid, minimise, mitigate and manage potential environmental and social impacts.

7.7 How compliance will be ensured

A monitoring and management framework will be developed to enable the potential positive and negative impacts to be monitored over time. It is proposed that the monitoring and management framework identifies the following key aspects:

- track progress of mitigation and management strategies;
- assess actual project impacts against predicted impacts;
- identify how information will be captured for reporting to impacted stakeholders including landholders, communities and government on progress and achievements;
- key performance indicators, targets and outcomes;
- responsible parties; and
- mechanisms for ongoing adaption of management measures when required.

To ensure the effectiveness of the management measures for the identified positive and negative impacts, it is recommended that a continuous improvement approach be adopted allowing for the review and adaption of impacts, management measures and outcomes.

7.8 Key uncertainties and proposed measures

Shell operates several energy storage systems internationally and has experience in operating their facilities to meet relevant standards and best available technologies. A competitive bid process will select an engineering, procurement and construction contractor with a demonstrated ability to build the project in a manner that is consistent with those mitigation and management strategies that have been proposed and summarised in Appendix D.

7.9 Conclusion

The project involves the development and operation of a large-scale BESS with a discharge capacity of 500 MW and a storage capacity of 1,000 MWh. The project will be within the NSW Government declared CWO REZ and will complement nearby existing and proposed renewable energy generation assets, including the Wellington Solar Farm (located opposite Goolma Road) the Uungula Wind Farm and the proposed 3 GW of additional generation to delivered as part of the CWO REZ. The project will function to smooth out fluctuations in electricity supply from these new intermittent power sources, providing system security and other network services.

The project will provide environmental, social and economic sustainability benefits to NSW as the project will facilitate a deeper penetration of intermittent renewable energy within the NEM. At a regional level, the project will contribute to the regional economy through increases in direct and indirect business turnover, value add, household income and job creation.

The project will result in environmental and social impacts as identified throughout the EIS, which will be managed through the mitigation and management measures described throughout, such that the project will not result in significant environmental or social impacts.

The project will achieve the following overall benefits:

- alignment with Commonwealth, NSW electricity policies and strategies, and regional plans;
- contribution to the overall storage capacity of the NEM and provide greenhouse gas benefits by increasing the surplus of electricity generated from renewable sources that are intermittent (such as solar and wind) and where previously gas-fired generation has supported peak demand;
- improvements to network reliability by providing back-up power during network disruptions; and
- decreases to average prices by smoothing out price differences (ie by arbitraging electricity price differences during peak and off-peak periods).

On balance, it is considered that the project will provide long-term livelihood benefits.

Definitions and abbreviations

Item	Definition
AC	alternating current
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHA study area	The local and broader regional are considered as part of the ACHA to identify local and regional Aboriginal heritage context.
AEMO	Australian Energy Market Operator
AHD	Australian Height Datum
ALUM	Australian Collaborative Land Use Mapping
AMPYR	AMPYR Australia Pty Ltd
APZ	asset protection zone
BDAR	Biodiversity Development Assessment Report
BDAR study area	The area of investigation for the biodiversity assessment and field study incorporating the disturbance boundary for the project along with additional areas of Lot 1 DP 1226751 and Lot 32 DP 622471 that were considered during preliminary constraints identification.
BESS	The portion of the project footprint dedicated to containing battery enclosures and ancillary infrastructure such as the control and office building.
BESS compound	The area supporting operational infrastructure associated with the project. The BESS compound will be surrounded by security fencing and accessed from the existing driveway via Goolma Road.
BESS substation	The portion of the project footprint dedicated to the on-site substation. The substation will convert electricity between the high voltage transmission network and medium voltage BESS compound.
Buffer area	1,500 m buffer of project footprint (site based developments only)
CCTV	closed-circuit television cameras
Construction boundary	The extent of actual surface disturbance required to facilitate the construction of the project.
CTMP	Construction traffic management plan
CWO REZ	Central-West Orana Renewable Energy Zone
DA	Development Application
dB	decibels
DC	direct current
DCP	Development Control Plan
Development boundary	The extent of the site where project infrastructure will be established.

Item	Definition
DPIE	Department of Planning, Industry and Environment
DPE	Department of Planning and Environment
DRC	Dubbo Regional Council
EIS	Environmental impact statement
EMF	Electromagnetic field
EMM	EMM Consulting Pty Limited
EMP	environmental management plan
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental planning and Assessment Regulation 2000
EPL	Environment Protection Licence
GHG	Greenhouse Gas
GW	gigawatts
HBA	Historic baseline assessment
HBA study area	The local and regional area considered to identify local and regional historic heritage context, of the order of 50 km beyond the project area.
IAQM	Institute of Air Quality Management in the United Kingdom
Indirect impact area	Area subject to anticipated indirect impacts, which was delineated as 5 m buffer from the subject land (construction boundary)
ISP	Integrated System Plan
kV	kilovolt
$L_{Aeq,15mins}$	Equivalent continuous sound level over 15 minutes
LEP	Local Environmental Plan
LGA	local government area
m	metres
m^3	cubic metres
ML	Millilitres
MCoA	Minister's Conditions of Approval

Item	Definition
MW	megawatts
MWh	megawatt hours
NEM	National Electricity Market
NSW	New South Wales
NVIA	Noise and vibration impact assessment
OEMP	Operational environmental management plan
OSOM	Oversize Overmass
PCS	power conversion system
PCT	Plant Community Type
PHA	Preliminary hazard analysis
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in aerodynamic equivalent diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic equivalent diameter
POEO Act	*Protection of the Environment and Operations Act 1997*
RL	Reduced level
RMS	NSW Roads and Maritime Services
SCADA	supervisory control and data acquisition
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Shell	Shell Energy Operations Pty Ltd
SEIFA	Socio-Economic Indexes for Areas
SIA	Social impact assessment
SSD	State Significant Development
t	tonnes
TfNSW	Transport for NSW
The project	The Wellington Battery Energy Storage System. This refers to all elements that comprise the project for which approval is sought.

Item	Definition
The site	The area proposed to be developed as a BESS and subdivided from the remainder of the landholding.
TIA	Traffic impact assessment
VIA	Visual impact assessment
WA	Water assessment
Wellington Substation	The 330/132kV substation operated by TransGrid and located at 6909 Goolma Road in Wuuluman (Lot 1 DP 1226751).
WHS	Work health safety

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