APPENDICES

# F

OVEN MOUNTAIN PUMPED HYDRO ENERGY STORAGE EIS

## Strategic context and need

OVEN MOUNTAIN PUMPED HYDRO STORAGE

EMM creating opportunities

# F.1 Strategic context

## F.1.1 Introduction

This document addresses the strategic context for the Project, including the NSW Government plans that provide strategic support and establish the local land use context for the Project. The SEARs that are relevant to this chapter are as follows:

> … the EIS must include:
>
> …
>
> - the relevant strategic context for the project having regard to:
>     - State and Commonwealth legislation, policies and guidelines, and current initiatives to improve energy security and reliability in the National Electricity Market
>     - key features of the environment that could affect or be affected by the project (including National Parks and Reserves, World Heritage Areas and areas of declared wilderness under the NSW *Wilderness Act 1987*)
>     - any other existing, approved or proposed projects that could result in cumulative impacts with the project

## F.1.2 Government strategies, policies and legislation

### i Transformation of the energy system

The national electricity market (NEM) operates as an interconnected power system that provides wholesale electricity to meet the electricity demands of consumers across Queensland, NSW and the Australian Capital Territory, Victoria, South Australia and Tasmania. It is overseen by an independent body, the Australian Energy Market Operator (AEMO). NEM infrastructure comprises both state and private assets which currently generate electricity from coal, gas and renewable sources, and is subsequently transported via high voltage transmission lines from generators to local distributors (AEMO) 2021). From the distributors, it is converted to low voltage electricity and delivered to almost 10 million homes and businesses across the NEM. The NEM works in real time through a centrally coordinated dispatch process, where wholesale electricity production is matched to electricity demand with available generating capacity kept in reserve for emergencies. NEM operation is designed to meet the objective of ensuring reliable, secure and affordable electricity is delivered to consumers.

Presently, most of the electricity generated for the NEM is sourced from coal-fired power plants, with NSW more dependent on coal for its electricity than any other state. In NSW during the 2020/2021 financial year, 64% of energy was generated by coal (AEMO 2021).

However, as established in AEMO's *2022 Integrated System Plan* (2022 ISP), multiple factors are driving a once-in-a-century transformation of the NEM in the way electricity is both generated (source change) and consumed. This means that there is a double transformation occurring, being:

- the change in the energy mix away from coal fired assets to be replaced with variable renewable energy (VRE) and firming technologies such as pumped hydro energy storage and batteries
- the electrification of the economy leading to a need for double the electricty currently generated to be delivered by 2050.

The factors driving this transformation include:

- Commonwealth Government commitments under the international *Paris Agreement* to meet net zero emissions by 2050
- Commonwealth and State Government policies committed to achieve net zero emissions by 2050
- Recently legislated commitments under the Commonwealth *Climate Change Act* 2022 (CC Act) to reduce greenhouse gas emissions by 43% on 2005 levels, by 2030
- technological innovation leading to increased energy efficency and rapidly decreasing costs of wind and solar generation
- ageing coal-fired generation assets and earlier withdrawal of these assets from the NEM than anticipated
- increased electrification of many sectors of the economy including electrification of homes, transport and industry
- consumer choice.

The 2022 ISP establishes an optimal development path (ODP) to guide the significant investment needed to physically and technologically transform the NEM. Of direct relevance to the justification for the Project, under the ODP, large investment is needed to treble the total firming capacity provided by sources other than coal, that can respond to a NEM dispatch signal. The 2022 ISP identifies these firming technologies as including pumped hydro energy storage and utility scale batteries, with modelling showing that, by 2050, these two technologies will provide approximately 16 gigawatts (GW) of dispatchable capacity (up from the current 1.5 GW currently provided). Figure F.1 below shows forecast NEM capacity under the ODP.

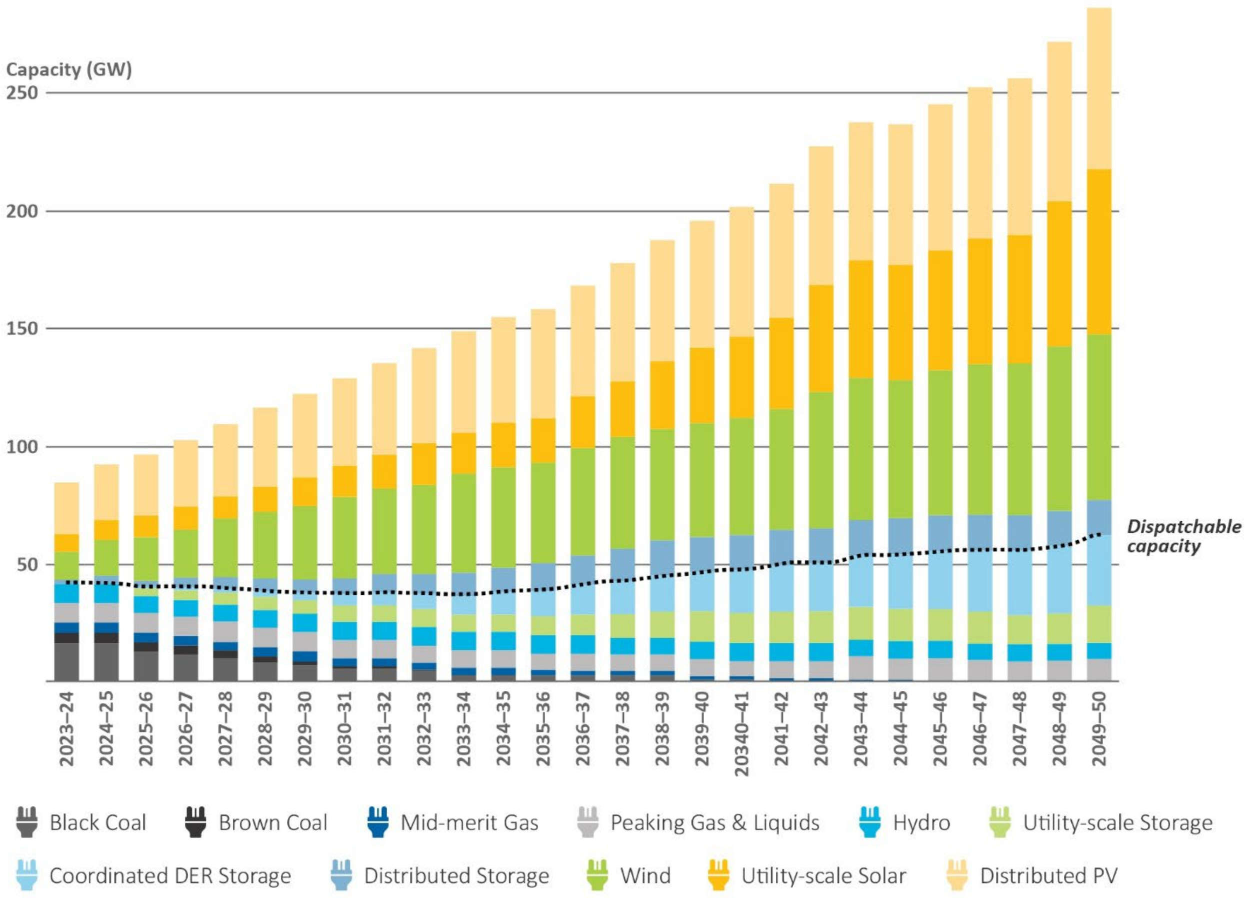



**Figure F.1 Forecast NEM capacity to 2050 (AEMO, 2022 ISP)**

During June 2022, AEMO suspended spot market trading across the NEM for the first time in history due to volatile wholesale pricing events, demonstrating that the challenges associated with the transition are now being realised. As demand for electricity grows consistently, Australia's coal-fired power generation output is at the lowest level that it has been over the past decade. The ageing coal plants are becoming less reliable and more expensive to maintain, often requiring unplanned outages to remediate.

Pumped hydro energy storage projects across NSW, including this Project, are major energy storage schemes that will aid in addressing the needs of the existing market and policy trends, while dealing with environmental and technical issues such as reducing carbon emissions and intermittency in electricity supply.

### ii Timing for withdrawal of NSW coal-fired assets and the need for firming capacity

NSW is expected to have one of the greatest requirements for energy replacement and capacity in Australia, as four of the five coal-fired power plants are set to retire within the next ten years. The current schedule for the retirement of all NSW coal-fired power plants is Liddell in April 2023, followed by Eraring in August 2025, Vales Point in 2029, Bayswater between 2030 and 2033 and Mount Piper by 2040.

The NSW Government's plan to meet the State's energy needs in this time of transformation is established in the *NSW Electricity Strategy* (Electricity Strategy). This strategy complements the work of the various NEM bodies, and one of the actions in the Electricity Strategy is the development of renewable energy zones (REZs) across NSW, with the Project being located within the declared 8 GW New England REZ. In addition to the Electricity Strategy, the NSW government released the *NSW Electricity Infrastructure Roadmap* (Electricity Roadmap) in November 2020, which was enabled by the NSW *Electricity Infrastructure Investment Act 2020* (EII Act). Together, these policies and legislation coordinate investment in transmission, generation, firming and storage to ensure a reliable, secure and affordable energy system.

Pumped hydro energy storage is identified by these plans and strategies as 'nature's battery' and is critical to firming VRE. This is further supported through NSW Government initiatives such as the *Pumped Hydro Recoverable Grants Program* and *Pumped Hydro Roadmap*. The NSW Government has already recognised the Project's alignment with this strategic policy framework and its importance to NSW energy security, with pre-construction grant funding being awarded to the Project under both the NSW Government's *Emerging Energy Program* and the *Pumped Hydro Recoverable Grants Program*. This grant funding must be at least matched by the Project and is mostly repayable when Project construction commences) In addition, the Project was designated critical State significant development (CSSI) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

To this end, the Project will provide up to 900 megawatts (MW) of renewable electricity generating capacity and, depending on the ultimate capacity of the plant, up to between eight and twelve hours of dispatchable energy at full generation to be stored and made available to the NEM. The type of storage that the Project offers is classified as long duration storage (2022 ISP; Section 43 of EII Act). The value of this storage is in its intra-day energy shifting capabilities, driven by daily energy consumption habits, as well as some coverage for VRE 'droughts' where there are long periods of lower-than-expected VRE availability (2022 ISP).

The Project has been strategically planned to address the pending retirement of NSW coal power stations, to firm the large amount of VRE coming into the system and will act to reduce the risk of emerging energy reliability gaps. The proposed timeline (refer to Figure F.2) allows for the Project to be available by 2028–29, in time to provide energy security and insurance against Eraring, Vales Point and Bayswater retirements, as follows.

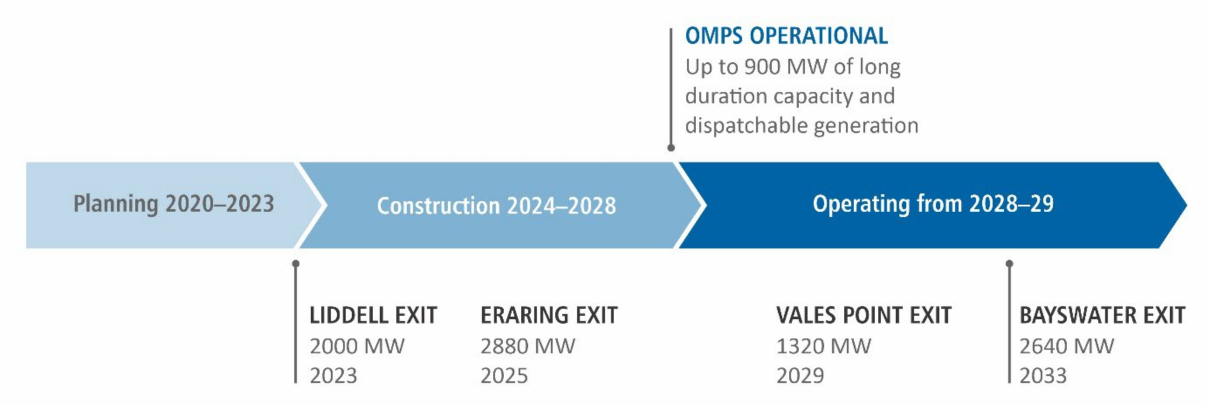



**Figure F.2 Proposed timeline for OMPS against planned coal-fired power station exits in NSW**

### iii Relevant government policies and legislation

An overview of relevant key policies, strategies and legislation and how the Project aligns with these, is provided in Table F.1 below.

## Table F.1 Relevant government policies and legislation

| Government plan or policy | Project alignment with policy |
|---|---|
| **International context** | |
| **The Paris Agreement**<br>*The Paris Agreement* is a legally binding international treaty designed to strengthen international efforts to limit the effects of climate change. It aims to hold the global increase in temperature to below 2 degrees Celsius ($^{0}$C) above pre-industrial levels. The Paris Agreement has been adopted by 196 countries, including Australia, and came into force on 10 December 2016.<br>In June 2022, the Australian Government committed to reduce emissions by 43% on 2005 levels, by 2030. This will put Australia on track to achieve net zero emissions by 2050. This commitment has been legislated through the CC Act, passed in September 2022.<br>As part of this pledge the Commonwealth Government are supporting the transition to renewable energy by investing in the transmission and storage needed to balance the grid, which will lower energy prices and support economic growth. | The Project will contribute to meeting Australia's commitments under the Paris Agreement by reducing the NEM's annual greenhouse gas emissions.<br>The Project is expected to generate over 1,188,000 megawatt hours (MWh) of electricity per year (based on 600 MW capacity), and during these times will be capable of meeting the needs of approximately 600,000 to 900,000 NSW households.<br>The Project will contribute to the NEM by providing long duration storage services supporting grid reliability as coal-fired generation retires and the firming of substantial amounts of additional renewable energy generation capacity. |
| **National context** | |
| **Commonwealth *Climate Change Act 2022***<br>The CC Act commenced in September 2022 and for the first time in Australia's history, mandates the Australian Government's commitment under the *Paris Agreement* to reduce greenhouse gas emissions by 43% on 2005 levels, by 2030.<br>The objects of the CC Act are to advance an effective response to the urgent threat of climate change, set out Australia's emissions reductions targets, require annual climate statements to be prepared by the responsible Minister to ensure accountability, and ensure independent advice from the Commonwealth Climate Change Authority informs the preparation of the Government's annual climate statements. | As noted above, the Project will contribute to meeting the commitments to reduce Australia's climate change emissions through the production of renewable energy and firming capabilities provided to enable VRE growth within the NEM. |
| **Large-scale Renewable Energy Target**<br>The Australian Government Clean Energy Regulator administers the Large-scale Renewable Energy Target (LRET) which incentivises investment in eligible renewable energy power stations.<br>The LRET of 33,000 GWh 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. | Energy produced by pumped hydro-electric power stations fall within the eligible renewable power station energy sources category for the LRET.<br>Once operational, the Project will generate the equivalent over 1,188,000 MWh of electricity annually (based on 600 MW capacity), which will contribute towards meeting the LRET in future years. |

## Table F.1 Relevant government policies and legislation

| Government plan or policy | Project alignment with policy |
|---|---|
| **2022 Integrated System Plan**<br>The 2022 ISP prepared by AEMO sets out an ODP to achieve the once in a century transformation of the NEM that is required to achieve net zero emissions by 2050.<br>As part of the ODP, the following is required:<br>• treble the amount of firming capacity provided by sources other than coal, that includes pumped hydro<br>• 16 GW of pumped hydro storage capacity and utility scale batteries<br>• double the amount of VRE.<br>REZs are identified in the ISP 2022 as areas where "clusters of large-scale renewable energy can be developed to promote economies of scale in high quality areas and capture geographical and technological diversity in renewable resources" (AEMO 2022). | The Project will contribute to the NEM by providing long duration storage services supporting grid reliability and the firming of additional renewable energy generation capacity.<br>The Project is located within the New England REZ, which is anticipated to be NSW's largest REZ at 8 GW of new renewable energy generation. The Project will therefore form a major part of the REZ, particularly from an energy production and energy storage perspective. The Project will be connected to a high voltage transmission backbone in NSW which connects to major load centres in NSW. |
| **State context** | |
| **NSW Electricity Strategy**<br>The Electricity Strategy is the NSW Government's plan for a reliable, affordable, and sustainable electricity future that supports a growing economy. Developed at a time when four of NSW's five remaining coal-fired generators were scheduled to close by 2033, the strategy outlines a reliable energy system which meets NSW's energy requirements and emission reduction targets.<br>The Electricity Strategy includes three layers:<br>1. supporting the market to deliver reliable electricity at the lowest price, while protecting the environment<br>2. setting an Energy Security Target (EST) to ensure NSW has enough generation capacity to cope with unexpected generator outages during periods of peak demand, such as heatwaves<br>3. ensuring the NSW Government has sufficient powers to deal with an electricity emergency, if one arises.<br>The Electricity Strategy, together with the Electricity Roadmap discussed below and its enabling legislation the EII Act supports the rolling out of REZs. Amongst other things, the EII Act establishes EnergyCo that will bring together investors and coordinate planning of the REZs so benefits to local communities are maximised. | The Project will contribute to the development of the declared New England REZ (8 GW) which will in turn meet the aims of the Electricity Strategy by ensuring a secure, reliable energy system. This region has been formally identified as an ideal location to play a key role in a renewable energy future for NSW due to its good renewable energy resources and opportunity to utilise electricity network infrastructure and a skilled workforce.<br>Once operational, the Project is expected to generate approximately 1,188 gigawatt hours (GWh) of electricity annually (based on 600 MW capacity) and during these times will be capable of meeting the needs of approximately 600,000 to 900,000 NSW households. Studies have shown that the Project is also an enabler of renewable energy being able to support up to 1.6 GW of additional inverter based renewable generation through the provision of grid system strength capabilities. |

## Table F.1 Relevant government policies and legislation

| Government plan or policy | Project alignment with policy |
|---|---|
| **NSW Electricity Infrastructure Roadmap**<br>The Electricity Roadmap, completed in late 2020, builds on the Electricity Strategy and is the NSW Government's plan to transform the electricity system into one that is cheap, reliable and clean.<br>The Electricity Roadmap coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The Electricity Roadmap includes actions that will deliver 'whole-of system' benefits. These include:<br>• a plan to deliver the state's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions<br>• a Transmission Acceleration Facility to fast-track the delivery of critical transmission infrastructure<br>• commitment to further funding to pumped hydro projects and the *Pumped Hydro Recoverable Grants Program*.<br>To achieve the needed energy reliability, the Electricity Roadmap draws on AEMO's projection of approximately 2.3 GW of long duration storage required in NSW over and above the 2 GW from the Snowy 2.0 Project. Pumped hydro energy storage is the primary source of long duration energy storage globally and is able to provide the bulk energy time shifting when needed. | The Project will form a major part of the New England REZ in NSW, providing long duration storage combined with up to 900 MW of generating capacity.<br>By utilising natural terrain features, pumped hydro energy storage can provide efficient, responsive and reliable long duration storage over an operational life of 100+ years.<br>The positioning of the Project within the New England REZ, its large capacity and quick-start energy generation will allow it to operate in tandem with and stabilise the energy generation of nearby VRE technologies located within the REZ. It will smooth out peaks and troughs in both supply and demand for electricity by pumping water to the upper reservoir when intermittent renewable energy output is high, and by providing quick-start electricity generation when renewable energy output is low and when demand is high. The Project will thereby place downward pressure on electricity prices. The Project may also be used to create additional inertia to provide the power grid with additional stability if necessary.<br>In addition to the Project's location primarily on private land within the REZ, it is also an ideal location due to the steep topography, access to the Macleay River (noting the system is 'off-river') and nearby TransGrid Line 965 for connection to the NEM. Furthermore, a high portion of civil works required in a pumped hydro project means the technology is local jobs intensive. |
| **NSW Energy Security Target and Safeguard**<br>The objective of the *NSW Energy Security Target* (DPIE 2020) is to give the market certainty about how much new electricity is needed to deliver a reliable energy system over the medium to long term, in light of the retirement of several large coal-fired generators. The *Energy Security Target* is established under the EII Act and is equivalent to the maximum demand experienced in NSW every 10 years, plus a reserve margin. AEMO has been appointed as the *Energy Security Target Monitor* and its first report released in December 2021 predicts a target breach from 2029–30.<br>A further Energy Security Target Monitor report was released by AEMO in May 2022. With the announcement by Origin that Eraring Power Station retirement will be brought forward to 2025 (earlier than planned under the 2020 ISP), there is a firming shortfall and a target breach is now forecast to result in 2025–26.<br>This signals the critical and urgent need for new generation and transmission infrastructure to ensure energy security for NSW consumers. | At up to 900 MW of generating capacity and, depending on the ultimate capacity of the plant, up to 12 hours storage, the Project provides long-duration storage which cannot be economically provided by batteries. As such, the Project is of a sufficient scale to significantly and positively influence the State's ongoing energy reliability and security.<br>Based on the target breach identified in AEMO's latest Energy Security Monitor Report, the Project is vital to be deployed to provide resilience and energy security for NSW consumers and to support the transition in the NEM away from coal -fired generation. This need also aligns and supports the CSSI status of the Project being essential for social, economic or environmental reasons. |
| **NSW Climate Change Policy Framework**<br>The *NSW Climate Change Policy Framework* (the Framework) defines the NSW Government's role in reducing carbon emissions and adapting to the impacts of climate change. It commits NSW to achieving net zero emissions by 2050 and sets policy directions to help guide implementation of the Framework. | The Project will contribute to the overall reduction of carbon emissions in NSW, helping the State of NSW to achieve its objective of net zero emissions by 2050. |

### Table F.1 Relevant government policies and legislation

| Government plan or policy | Project alignment with policy |
|---|---|
| **Net Zero Plan Stage 1: 2020–2030**<br>Following on from the Framework, the *Net Zero Plan Stage 1 2020–2030* (DPIE 2020) is the foundation for NSW action on climate change. It outlines the NSW Government's plan to grow the economy and create jobs while helping the state to deliver a 50% cut in emissions compared to 2005 levels. The implementation of the Net Zero Plan, together with the Electricity Roadmap, will result in more than 9,000 jobs and up to $37 billion in private investment, the majority expected to be across regional NSW. | The Project contributes to Priority 1 of four priorities identified in the Plan: "Drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living."<br>See Section 6.14 of the EIS for a discussion on the positive economic impacts of the Project. |
| **Pumped Hydro Roadmap**<br>The *Pumped Hydro Roadmap*, completed in late 2018, sets out actions aimed towards encouraging and promoting increased pumped hydro energy storage across NSW. The key actions of the roadmap include:<br>• bringing forward private investment by opening state-owned water infrastructure and supporting the commercialisation of new, large scale, on-demand electricity projects<br>• mapping the landscape for pumped hydro energy storage<br>• providing guidance on the regulatory process for large-scale hydro energy projects. | The Project is directly aligned to the *Pumped Hydro Roadmap* and has been formally recognised as being so through the award of pre-construction grant funding under the *Emerging Energy Program* and the *Pumped Hydro Recoverable Grants Program*. |
| **State Environmental Planning Policy (Planning Systems) 2021 – the Project is CSSI**<br>Under the EP&A Act, the NSW Planning Minister has the power to declare a specified project on specified land to be CSSI if the Minister forms the view that it is essential to the State for environmental, economic or social reasons. | The NSW Planning Minister has formed the view that the Project is essential to NSW for environmental, economic or social reasons. Therefore, the Minister declared the Project to be CSSI on 4 September 2020.<br>See Chapter 4 of the EIS for further details on the Statutory Context for the Project. |
| **Regional and local context** | |
| **New England North West Regional Plan 2041**<br>The *New England North West Regional Plan 2041* (Regional Plan 2041) (DPIE, September 2022) sets the 20 year strategic land use planning priorities for the region and provides a framework for regional and local planning decisions. The Regional Plan 2041 recognises the growth opportunity for the region of the renewable energy sector. In this respect, the Regional Plan 2041 includes 22 objectives, of which Objective 9, Lead renewable energy technology and investment, is directly relevant to the Project. | The Project is directly aligned with and referenced in Objective 9 of the Regional Plan 2041, with its location within the New England REZ and essential role in providing energy storage. |
| **Armidale Regional Plan 2040**<br>The *Armidale Regional Plan 2040* provides an overarching strategy and vision for the future, reflect the priorities of the community and gives certainty around the direction of plans and growth for the next 20 years. | The Project is aligned with the *Armidale Regional Plan 2040* with its large and critical contribution to development of the renewable energy sector and jobs in the region. |

**Table F.1 Relevant government policies and legislation**

| Government plan or policy | Project alignment with policy |
|---|---|
| **Armidale Regional Council Local Strategic Planning Statement 'A Plan for 2040' (Final October 2020)**<br>The *Armidale Regional Council Local Strategic Planning Statement 'A Plan for 2040'* (Armidale LSPS 2040) 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. Armidale LSPS 2040 identifies four themes that are supported by strategies to reach desired outcomes, including community, economy, infrastructure and environment. Of these the following themes, planning actions and/or goals have been identified as relevant to the Project:<br>• Planning Action – Theme 3. Infrastructure:<br>– Infrastructure: plan for and facilitate the delivery of infrastructure (3A).<br>• Planning Action – Theme 3. Infrastructure:<br>– Renewable Energy: investigate and facilitate potential opportunities for development of renewable energy production facilities (3H).<br>Goal – Theme 2. Economy: A strong and dynamic regional economy:<br>• Grow New England North West as the renewable energy hub of NSW (D5).<br>• Deliver new industries of the future (D6).<br>Goal – Theme: 3 Infrastructure: Strong infrastructure and transport networks for a connected future:<br>• Coordinate infrastructure delivery.<br>Goal – Theme 4. Environment: A healthy environment with pristine waterways:<br>• Sustainably manage and conserve water resources (D.10).<br>• Protect areas of potentially high environmental value (D.11).<br>• Adapt to natural hazards and climate change (D.12). | The Armidale Regional Council (ARC) recognises the Armidale region has strong potential and is a prime location for renewable energy, with strong potential for wind, solar, bioenergy as well as pumped hydro and geothermal energy sources (ARC 2020).<br>The ARC recognises that the New England REZ can deliver many benefits for local communities including electricity reliability, increasing affordability, supporting emissions reduction and engaging local businesses and community members (ARC 2020).<br>The Project will support ARC's planning actions and goals, by contributing to the local economy, renewable energy/electricity, as well as by delivering new infrastructure (roads and transmission lines) and new industries and jobs.<br>The Project is set in an area of high diversity value and has been refined to avoid and minimise impact in areas of high biodiversity. A BDAR has been developed for the Project and summarised in Section 6.2 of the EIS and provided at Appendix H. |

## F.1.3 Regional and local land use context

### i Regional context

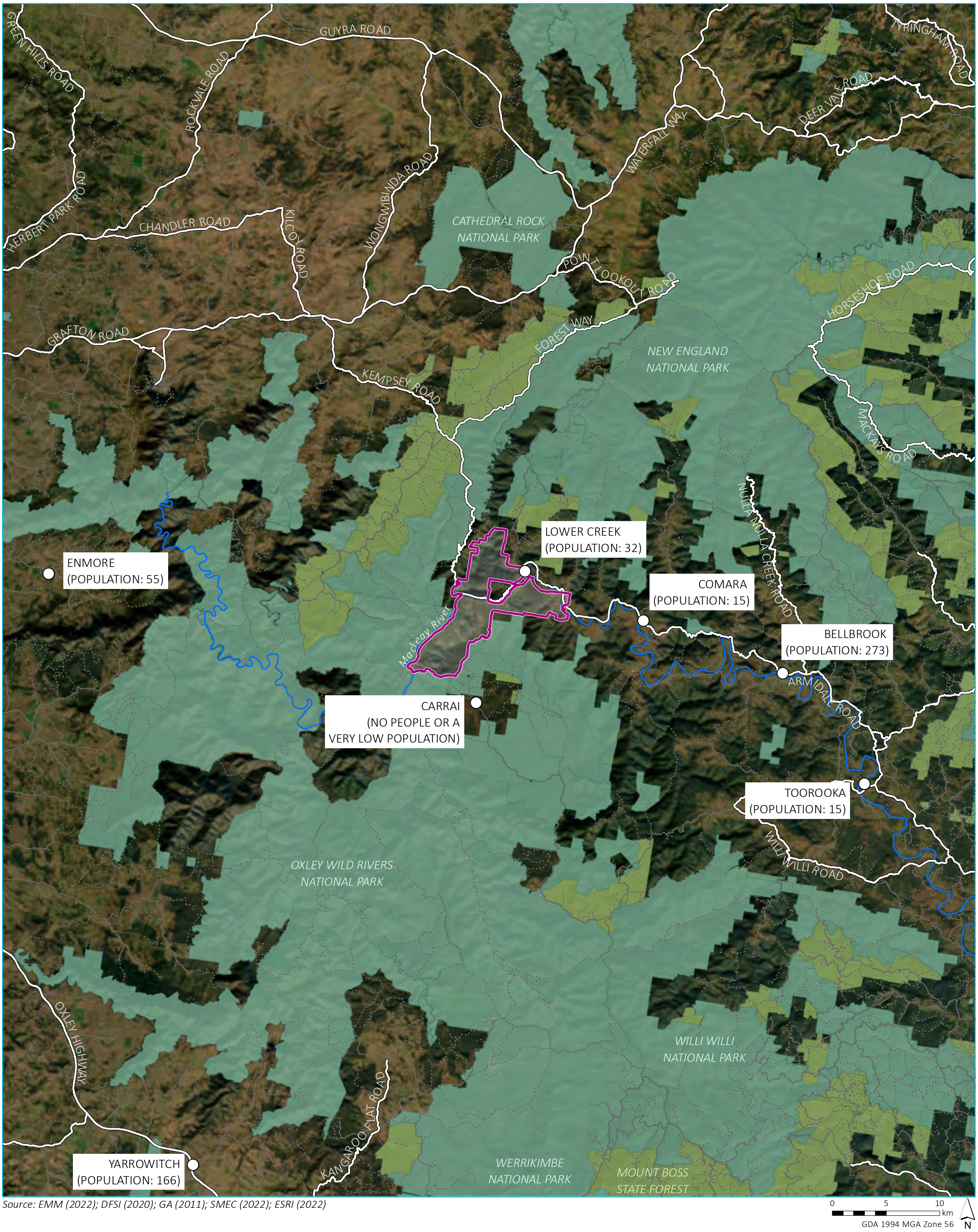
The Project area is located on adjacent parcels of land within a broader setting characterised by a mix of national parks, conservation areas and nature reserves and large private land holdings within the Armidale Regional local government area (LGA). The regional and local context of the Project area are shown in Figure F.1 and Figure F.2 respectively. The Project area is located away from towns, in an area with very low population density and with only a few receivers nearby to the Project area.  There are no national parks or conservation areas within the Project area.

The nearest, large regional centres to the Project area are Armidale and Kempsey. Armidale is approximately 60 kilometres (km) north-west, and Kempsey is about 75 km south-east of the Project area. Based on 2021 *Census of Population and Housing* (2021 Census) data, Armidale had a population of 37,537 people, and a median age of 39 (ABS 2021). In 2021, Kempsey had a population of 15,654 people, and a median age of 42 (ABS 2021).

Other nearby population centres in the vicinity of the Project area include:

- Lower Creek (population 32), approximately 8 km east
- Bellbrook (population 273), approximately 30 km south-east
- Comara (population 15), approximately 13 km north-east
- Toorooka (population 15), approximately 30 km east
- Enmore (population 55), approximately 40 km west
- Yarrowitch (population 166), approximately 50 km south.

The population of the Carrai area, which encompasses parts of the Project area was not available at the time of the 2021 Census because the selected area “had no people or a very low population in the 2021 Census” (ABS 2021).

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*Source: EMM (2022); DFSI (2020); GA (2011); SMEC (2022); ESRI (2022)*

KEY

- Project area
- Population centre
- NPWS reserve
- State forest

Existing environment

- Macleay River
- Major road
- Minor road
- Vehicular track

## Population centres in vicinity of the Project area

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Strategic context and need
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Figure F.3

The Project area is located within the New England tablelands (New England Orogen geological province), which forms part of the New England fold belt. Geology consists of faulted Carboniferous and Permian sedimentary rocks, granite intrusions and extensive Tertiary basalts. This geology has strongly influenced the variability in topography (hills and plains ranging from 600–1,500 metres (m) elevation), soil types, and rainfall and temperature patterns in the region (DPIE 2016). The Project area is located on the western slope of the Carrai Plateau, which is underlain by a middle Triassic aged granodiorite intrusion. The top of the intrusion forms a flat tableland, surrounded by deeply incised creeks and tributaries associated with the Macleay River. The Carrai Plateau is part of a chain of north-west to south-east trending belt of intrusive I-type granitoid bodies between Wauchope and Round Mountain (Gilligan et al. 1992). Mapping completed by the Geological Survey of NSW (GSNSW) indicates two geological units underly the proposed project alignment: the Carrai Granodiorite, and the Parrabel Beds, which are a formation within the Nambucca Beds Group. Overlying these units are soils comprising of alluvium, colluvium and landslide debris. This soil layer was suggested to be relatively shallow (<5.0 m).

The Project area is located within the Nambucca Block of the New England Orogenic Province. The Nambucca Block is a 3–4 km thick sequence of Early Permian to late Carboniferous sedimentary rocks, with minor felsic and mafic volcanic and rare calcareous horizons (Gilligan et al. 1992). The Nambucca Block has undergone multiple phases of deformation and thermal metamorphism.

The Macleay River is a perennial watercourse with a catchment area of approximately 11,400 square kilometres ($km^2$). The Macleay River catchment drains from the New England Tablelands in the west to the Pacific Ocean in the east. The river rises at the edge of the New England Tablelands where it descends through a series of steep gorges before emerging into an area characterised by lower elevation hills downstream of Georges River. The river then meanders for a further 140 km before reaching the tidal limit at Belgrave Falls, 10 km upstream of Kempsey (Ryder et al. 2016). Land use within the Macleay River catchment is diverse and includes fishing, cropping, grazing, mining, forestry, commercial, urban development, and National Parks. The dominant land uses within the catchment are agricultural grazing (53%) and vegetated area (26%). Most of the vegetated area exists through the gorge and midland hill regions.

### ii Local context

The Project area is intersected by the Macleay River with the Carrai National Park to the east. Cunnawarra National Park, Oxley Wild Rivers National Park, and Carrai State Conservation Area are proximate to the Project area. Much of the Project area contains undulating and steep terrain ranging in elevation from approximately 150 m to 1,000 m above sea level with vegetation ranging from heavy to cleared. Within the Project area, the disturbance footprint will total approximately 330 hectares (ha).

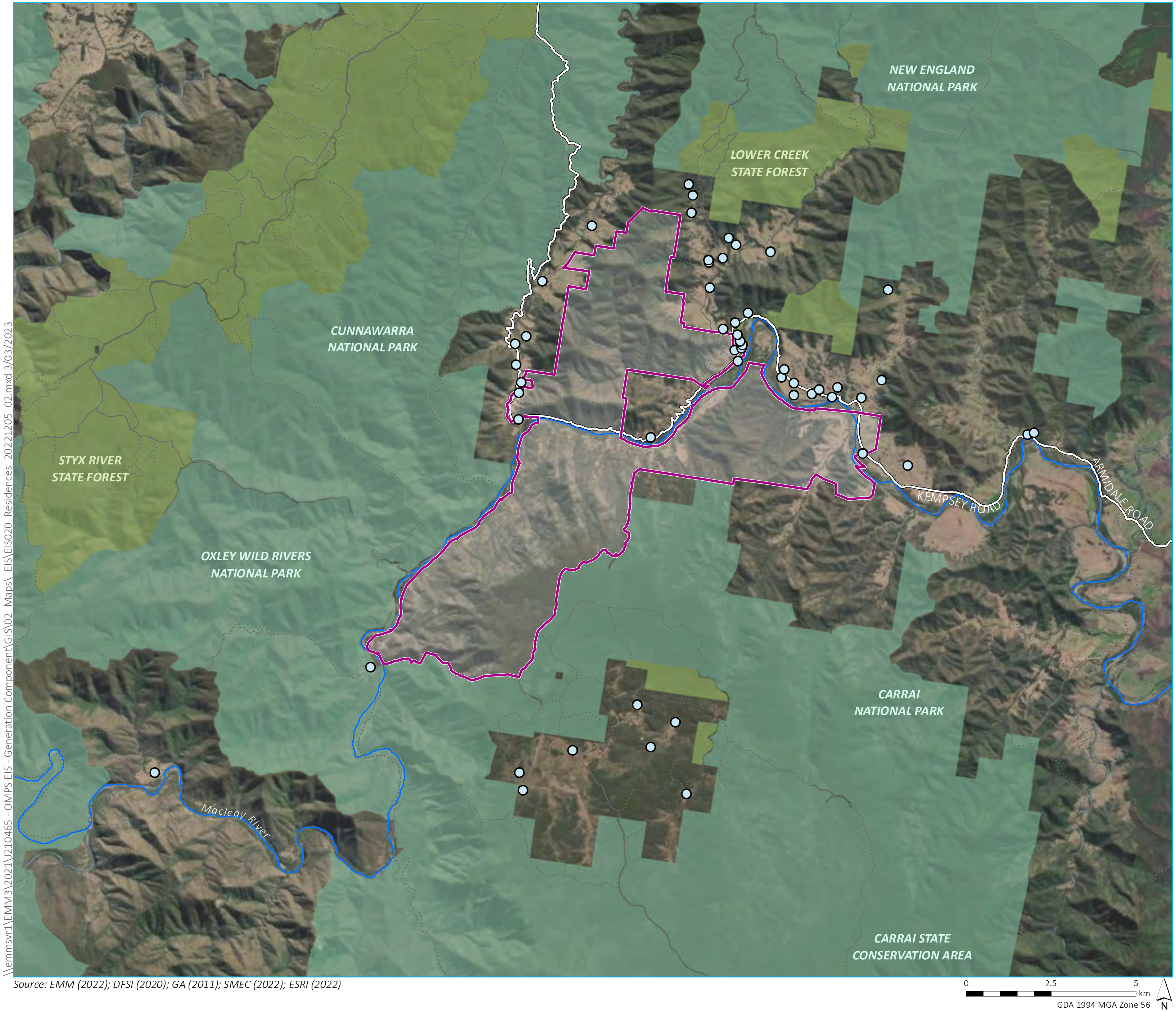
The Project area is bordered to the south by Oxley Wild Rivers National Park, which forms part of the Gondwana Rainforests of Australia (GRA), shown in Figure F.4. The GRA is also nearby to the western border of the Project area where the Macleay River is situated between the Project area and the GRA (close to its western bank).

Additionally, there are declared wilderness areas (in accordance with Section 8 of the NSW *Wilderness Act 1987*), to the east of the Project area. The GRA and declared wilderness areas have been identified and assessed in the BDAR prepared for the Project, and potential direct and indirect impacts are outlined in Appendix H of this EIS.

There are several fire trails in proximity to the Project area. Peach Tree Creek Trail, Cochranes North Trail, Cochrane Fire Trail, and Old Stock Reserve Trail traverse the Carrai State Conservation Area to the east of the Project area. The East Kunderang Road Trail is to the southwest of the Project area and Macleay River traversing the Oxley Wild Rivers National Park. The Haydons Trail and the Eastern Boundary Trail which turns into the Macleay Trail as it approaches the Macleay River traverse the Cunnawarra National Park to the west of the Project area.

A section of the National Trail passes through the western side of the Project area. The section of the National Trail that passes through the Project area is part of the 'Ebor to Barrington Tops' section, or the eighth section of the trail.

There are approximately 38 residences or receptors within a 2 km buffer of the Project area. Of these receptors, approximately 23 are within 1 km, and around 12 are within 500 m of the Project area. It should be noted that not all receptors are inhabited residences, and no receptors are within 1km of the pumped hydro system. The location of these residences and receptors can be seen in Figure F.4.

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Source: EMM (2022); DFSI (2020); GA (2011); SMEC (2022); ESRI (2022)

KEY

- Project area
- Residences
- Major road
- Minor road
- Vehicular track
- Macleay River
- Named waterbody
- NPWS reserve
- State forest

Potential local receivers

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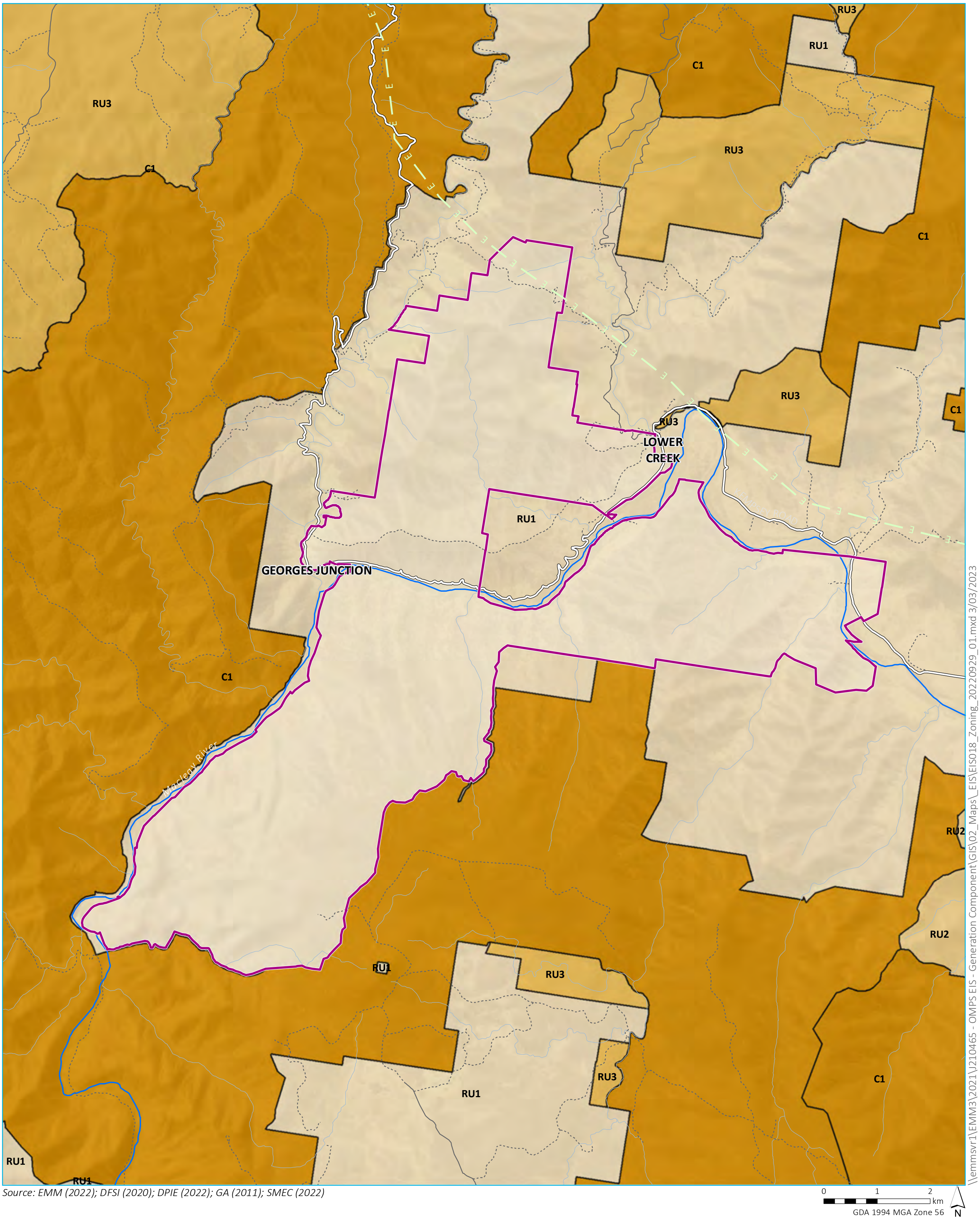
Figure F.4

creating opportunities

The land zoning in proximity and within the Project area is shown in Figure F.5. The Project area is zoned RU1 Primary Production under the *Armidale Dumaresq Local Environmental Plan 2012* (the LEP). The Project area is predominantly freehold land and currently used for recreational purposes, logging and livestock agistment. Predominant land uses in the surrounding area include agriculture, forestry, national parks and reserves and rural residential development. The land use across and in proximity to the Project is shown in Figure F.6.

There is no Biophysical Strategic Agricultural Land (BSAL) identified within the Project area, however there is some BSAL identified north of the Project area, along Kempsey Armidale Road. BSAL is identified as land with high quality soil and water resources capable of sustaining high levels of agricultural productivity.




*Source: EMM (2022); DFSI (2020); DPIE (2022); GA (2011); SMEC (2022)*

KEY

Project area

Land zoning

C1 National Parks and Nature Reserves

RU1 Primary Production

RU2 Rural Landscape

RU3 Forestry

Existing environment

Macleay River

Watercourse/drainage line

Major road

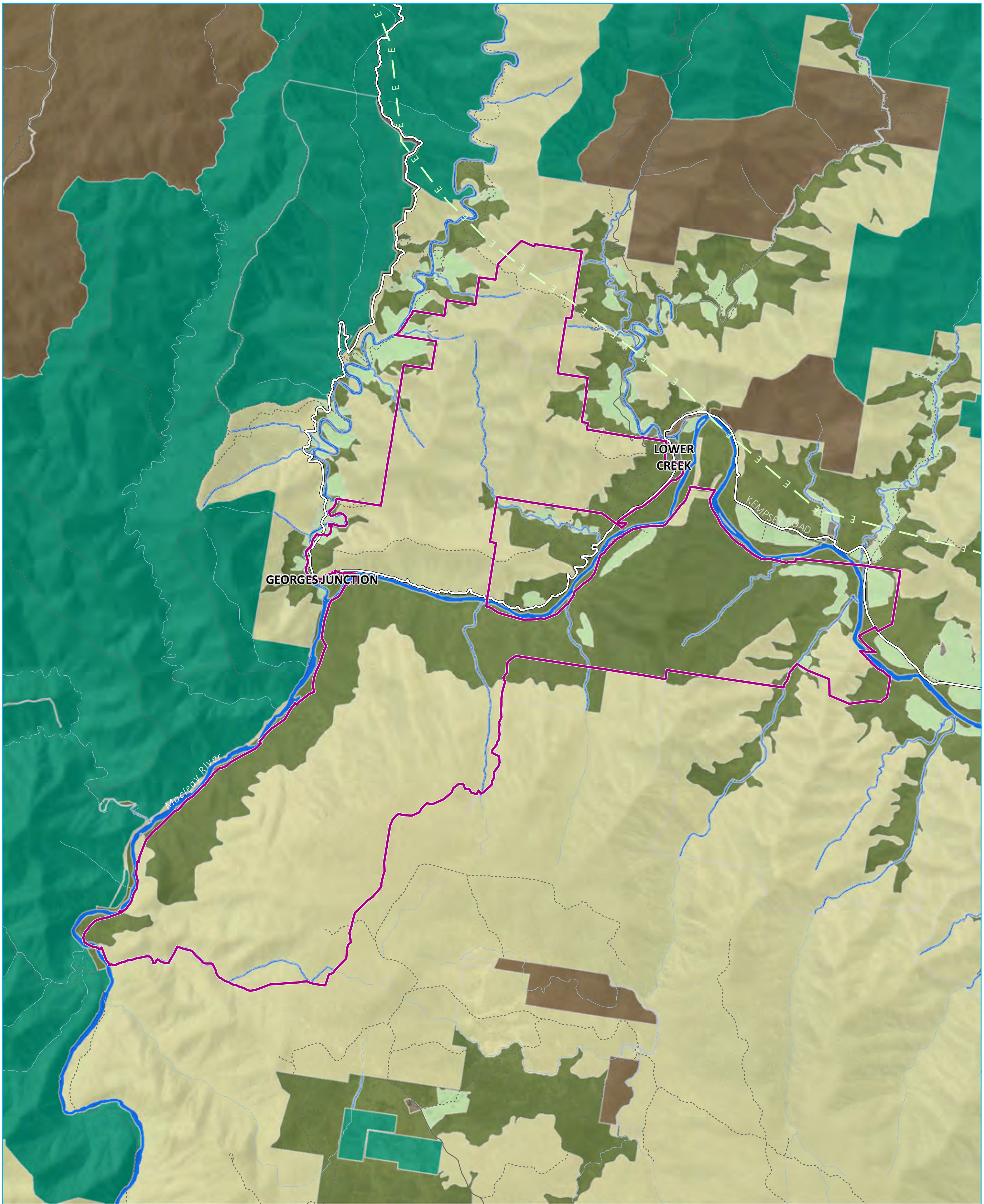
Minor road

Vehicular track

Existing transmission line

Land zoning

Oven Mountain Pumped Hydro Energy Storage Project
Strategic context and need
OMPS Pty Ltd
Figure F.5




*Source: EMM (2022); DFSI (2020); DPIE (2017); GA (2011); SMEC (2022)*

0 1 2 km
GDA 1994 MGA Zone 56
N

KEY

Project area

NSW landuse (DPIE, 2017)

- 1.1.0 Nature conservation
- 1.3.0 Other minimal use
- 2.1.0 Grazing native vegetation
- 2.2.0 Production native forestry
- 3.2.0 Grazing modified pastures
- 5.7.0 Transport and communication
- 6.3.0 River

Existing environment

- Macleay River
- Watercourse/drainage line
- Major road
- Minor road
- Vehicular track
- Existing transmission line

Land use

Oven Mountain Pumped Hydro Energy Storage Project
Strategic context and need
OMPS Pty Ltd
Figure F.6

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### F.1.4 Key features of the Project environment

#### i Key natural and built environment features

Key features in and around the Project area are listed below.

- The main vehicular access point to the Project is via the Kempsey Armidale Road, which runs through the Project area. It will be used as a key access route throughout the construction and operation of the Project. The Kempsey Armidale Road is a classified regional road that links Armidale and Kempsey.

- The Project area is situated on the western slope of the Carrai Plateau within the New England Tablelands. The Project area consists of steep topography ranging from about 150 m to 1,000 m above sea level with vegetation throughout the area varying from cleared to heavy.

- The Macleay River runs adjacent and through the Project area with the generation components of the Project to the south of the river and transmission assets on the northern side of the river. The Macleay River will be used to provide water for the reservoirs during the initial filling as well as during the periodic top ups.

- A 132 kilovolt (kV) transmission line runs through the northern end of the Project area. This line, which is owned and operated by TransGrid, runs from TransGrid's Kempsey substation to its Armidale substation and is known as Line 965. The electricity generated by the Project will be distributed to the NEM via this transmission line.

- As previously stated, there are nearby areas designated as part of the GRA. Figure F.4 shows the location of the GRA, which borders the Project area to the west and south and can also be found to the north. The GRA is comprised of major rainforests in north-east NSW and south-east Queensland. They contain exceptional examples of the Earth's evolutionary history and geological processes and have outstanding biodiversity value.

- In addition to the national parks, GRA and conservation areas, there are also declared wilderness areas proximate to the Project area, which are protected and managed under the Wilderness Act. The location of the nearby wilderness areas is shown in Figure F.4.

- From a geologic standpoint, the Project area is located within the Nambucca Block of the New England Orogenic Province. The Nambucca Block is a 3–4 km thick sequence of Early Permian to late Carboniferous sedimentary rocks, with minor felsic and mafic volcanic and rare calcareous horizons (Gilligan et al. 1992). The geological units underlying the Project area are Carrai Granodiorite and Parrabel Beds. The soil layer is relatively shallow (5 m or less) and is made up of colluvium, alluvium and landslide debris.

- There are several fire trails in proximity to the Project area. The Cochranes North Trail, Old Stock Reserve Trail and other trails traverse the Carrai State Conservation Area to the east of the Project area. The East Kunderang Road Trail is to the south of the Project area, traversing the Oxley Wild Rivers National Park. The Haydons Trail and the Eastern Boundary Trail (which turns into the Macleay Trail as it approaches the Macleay River) both traverse the Cunnawarra National Park to the west of the Project area.

- The National Trail runs along the western boundary of the southern part of the Project area. The National Trail follows historic coach and stock routes, old pack horse trails, mail runs and country roads for over 5,000 km through Queensland, NSW, Victoria and the Australian Capital Territory. The National Trail was originally conceived as a route for the long distance horse trekker but is now used by cyclists and walkers as well (www.bicentennialnationaltrail.com.au).

In addition, as has already been stated, the Project area is within the New England REZ that was formally declared on 17 December 2021. One of five REZs declared in NSW, the New England REZ is expected to be a source of significant energy production as NSW's energy mix shifts to be more reliant on renewable energy technologies. The region was selected as it was determined to be a suitable location due to its potential for large-scale renewable energy production, its proximity to existing electrical infrastructure, its potential ability to meet demand for electricity in population centres in both NSW and Queensland, and the compatibility of its existing land uses with renewable energy production. The landscape of the area was also a factor, as the topography of the region allows provides the potential for the REZ to include pumped hydro-electric projects such as the Project.

The location of the New England REZ is shown in Figure F.3. The Project area is located near the eastern boundary of the REZ.

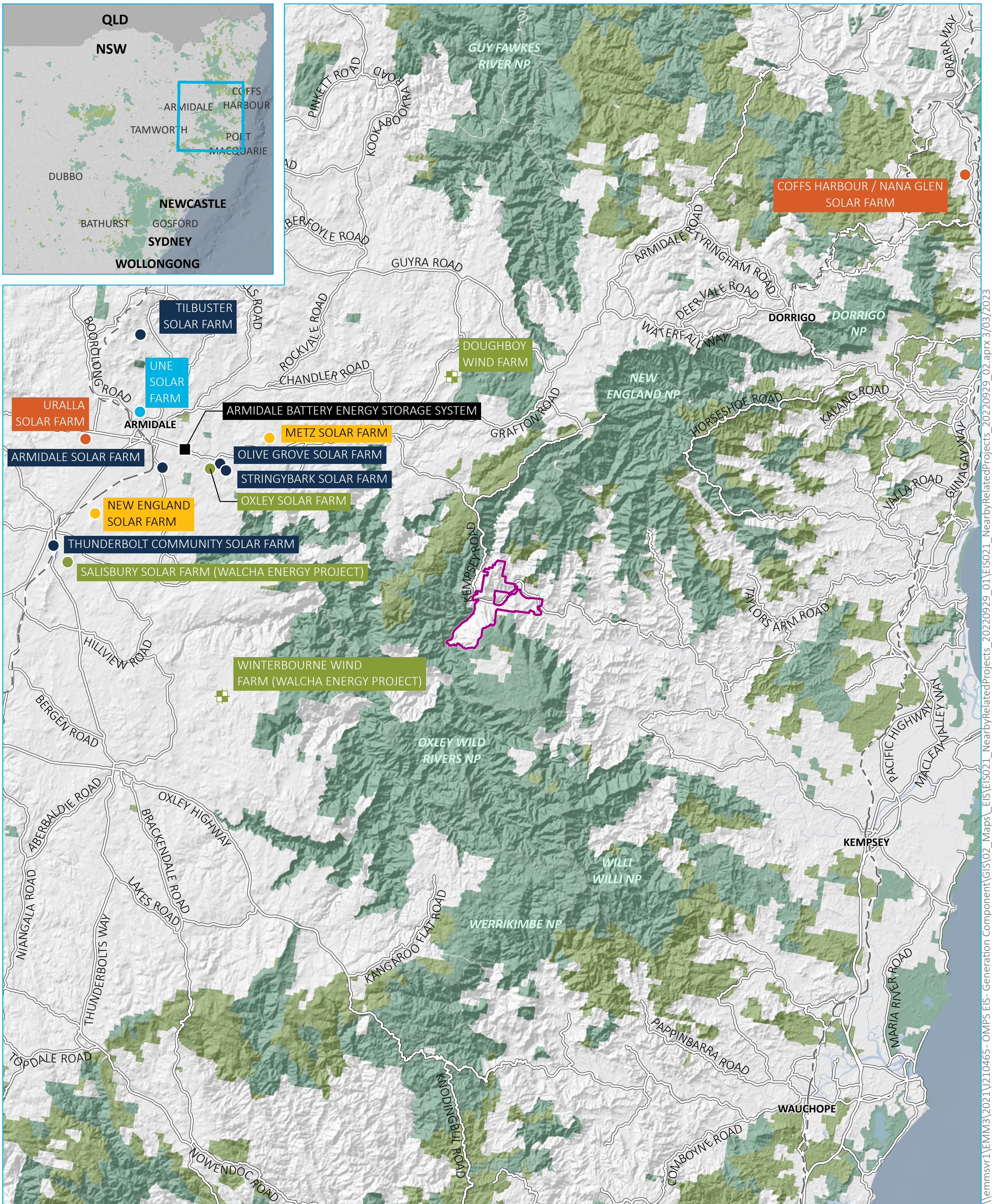
Significantly more renewable energy projects are expected to be constructed within the New England REZ in addition to projects such as the Salisbury Solar Farm, Winterbourne Wind Farm, and Oxley Solar Farm pictured in Figure F.7. As per NSW EnergyCo's plan for the REZ, it is intended to ultimately provide a network capacity of 8 GW, predominantly driven by over $10 billion in private sector investment.

### F.1.5 Cumulative impacts

As required by the *Cumulative Impact Assessment Guideline for State Significant Projects* (CIA Guideline, DPIE 2021), searches of the NSW Planning Portal (major projects), the Regional Planning Panel website and Council website have identified that there are no other major or local developments within close proximity to the Project (within approximately 25 km of the Project area).

Figure F.7 shows other major projects in the region but are located more than 25 km from the Project area.

Cumulative impacts have been addressed in Section 6.16 of the EIS.




Source: EMM (2022); ABS (2021); DFSI (2020, 2021); GA (2011)

KEY
- Project area

Energy infrastructure projects
- Battery - In Planning
- Solar - Approved
- Solar - In Planning
- Solar - Operational
- Solar - Under Construction
- Solar - Withdrawn
- Wind - In Planning

Existing environment
- Rail line
- Major road
- NPWS reserve
- State forest

Nearby related projects

Oven Mountain Pumped Hydro Energy Storage Project
Strategic context and need
OMPS Pty Ltd
Figure F.7

EMM
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### F.1.6 Alternatives to the Project

#### i Site selection

OMPS has reviewed the pumped hydro energy storage potential of the Project area considering key development attributes including natural terrain, capacity, grid connection, community as well as planning and environmental constraints. The Project area provides optimal conditions for the development of an off river pumped hydro energy storage project and associated infrastructure for the following reasons. The Project area:

- Possesses excellent characteristics for pumped hydro energy storage development, namely a significant 'head' height, low horizontal reservoir separation, and natural rock formations which are ideally shaped to work as reservoirs.
- Will enable the effective construction and operation of a closed loop or 'off river' pumped hydro energy storage system.
- Is next to the Macleay River, which will enable water intake for the initial fill during construction, and any subsequently needed operational top-ups for seepage and evaporation.
- Is located away from towns and population centres, in an area with very low population density and with only a few sensitive receivers nearby to the Project area.
- Enables the construction of access roads that will easily connect to a major road (Kempsey Armidale Road).
- Will allow for the construction of a new electricity transmission network from the generation site to the Lower Creek area, which can be connected to an existing transmission line.
- Allows flexibility to design the Project area to avoid or minimise impacts where possible.
- Location within the New England region is ideally placed to contribute to the New England REZ and assist in meeting NSW's energy generation and storage requirements.
- Is located primarily on private land.

Biodiversity values of the Project area and surrounds have been considered throughout the Project's scoping and preliminary ecological assessment. The Project area selection and layout have been amended to retain biodiversity values and ensure that there are no significantly adverse biophysical, cultural, social, or economic impacts. Areas of higher value native vegetation have been avoided where practical.

Significant surveys have been completed across the Project area to ensure that Aboriginal heritage sites have been identified and adverse impacts to any culturally significant areas have been avoided.

#### ii Alternatives considered

#### a Alternative locations

Analysis into the viability of a pumped hydro energy storage project within the Project area has been undertaken over a period of decades, beginning with extensive studies performed in the 1990s. Investigations into the Project area's geology for the purpose of gauging the suitability of the area for tunnelling was undertaken by SMEC Australia Pty Ltd (SMEC) in 1996, which provided valuable information about many of the Project's key elements. Intrusive field investigations were performed to a depth of 50 m, and the conclusion was reached that the area is suitable for the construction of dams and tunnels and is considered a premier development site for pumped storage hydro in NSW.

The findings from SMEC's 1996 field investigations were collated into a series of reports in 1997, the results from which were supported by a third-party investigation in 2009. Both investigations found that there were no technical factors that should prevent the Project from advancing to further stages of development, concluding that the attributes of the Project area make it highly suitable for a pumped hydro energy storage project.

A concept design study to identify and screen potential options was completed by SMEC in 2019/2020 with the goal of developing a pumped hydro system that is technically sound and economically viable. A 15% level feasibility design was completed by SMEC in 2022, building on both the concept design and site investigations.

In addition to the studies undertaken in the 1990s, a review was performed of the Australian National University's (ANU) 2017 data set that identified 22,000 potential pumped hydro energy storage sites throughout Australia. 8,578 of these sites are located within NSW. OMPS undertook a review of these sites, applying sensible development analysis steps, particularly:

- Initial estimates, pairing each of the 8,578 NSW sites, yielded 36,782,464 combinations and therefore a sensible filtering approach was required.

- Pairing of reservoirs based on elevation difference of greater than 100 m, and spatial distance of less than 10 km. While there are pumped hydro developments with reservoir separations of greater than 10 km, OMPS views distances of greater than 10 km assists in minimising capital cost and improving scheme efficiency through lower waterway losses. The application of this logic step resulted in 133,715 combinations of reservoirs.

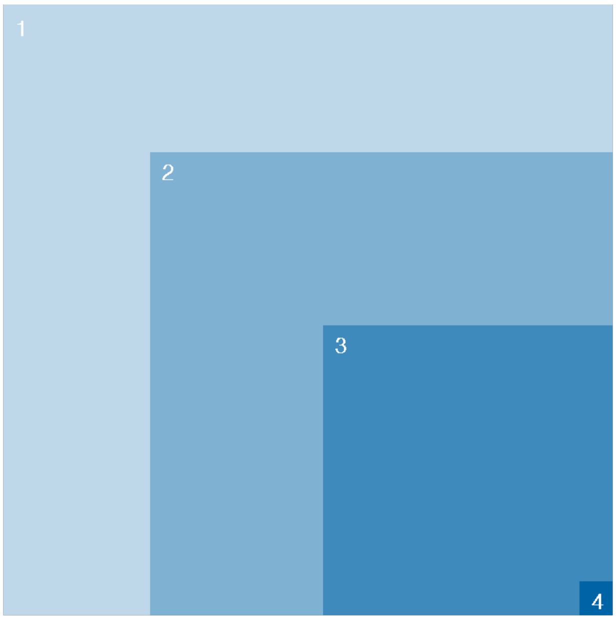
- The 133,715 reservoir pairs were then assessed relative to environmentally sensitive regions. Nearly a quarter of the reservoir pairs requires tunnelling through environmentally sensitive regions. This is understandable as the regions that are conducive for pumped hydro (e.g. with high hydrological heads) are in complex terrain which would have been historically difficult to exploit for agriculture and likely converted to environmental reserves.

  A similar filter has been applied to the pairing of reservoirs to the transmission network, which resulted in over a quarter of the data removed due to the project electrical connections passing through environmentally sensitive regions.

  The application of these two filters alone removed over half of the original 133,715 reservoir permutations, leaving some 63,540 reservoir combinations.

- Finally, a further filter of hydrological head has been applied to the dataset to look at those reservoir combinations that have elevation differences of greater than 300 m. Hydrological head strongly influences the capital cost and operational efficiency of a project with the potential energy linearly proportional to the head. The higher the head, the lower the required water volumes, the lower the dam requirements, and the greater the efficiency of the turbines.

Applying a 300 m head filter resulted in 736 reservoir combinations, which is some 0.6% of the original 133,715 reservoir combinations. The application of the filters is shown in Figure F.8 and Figure F.9.




1. **8578** Reservoirs – **133,175** combinations based on:
   - Head > 0m
   - Reservoirs < 10km separation
2. **101,421 (76%)** - excluding tunnelling in environmentally sensitive areas
3. **63,540 (48%)** - excluding connection through environmentally sensitive areas
4. **736 (0.6%)** - combinations sensible to investigate further (hydrological head of 300m or more)

**Figure F.8 Overview of reservoir site opportunity review**

A high hydrological head and a low distance between reservoirs are the two key engineering factors to project cost effectiveness. Hydrological head impact is discussed above, while the distance between reservoirs drives the amount of tunnelling required which impacts both scheme cost as well as operational efficiency and responsiveness. Longer tunnels have increased flow friction, increasing losses. Longer tunnels also have larger water columns and associated increased inertia forces acting against rapid operational change requirements.

In these regards, the Project area is one of the most suitable sites identified in NSW by the ANU's data set as it has the highest hydrological head of any site assessed and has among the shortest distance between reservoirs. The 736 reservoir combinations were classified by hydrological head and reservoir separation distances along with the Oven Mountain Project and shown in Figure F.9. No site was found to have a shorter distance between reservoirs than the Project, with 15 sites at the same reservoir separation as Oven Mountain. Similarly, no site was found to have a hydrological head close to that of the Project, the nearest being one site at 550 m and 20 sites at 500 m. On this basis, it is clear to see that the Project is a superior site based on the assessment of the independently developed pumped hydro opportunity library.

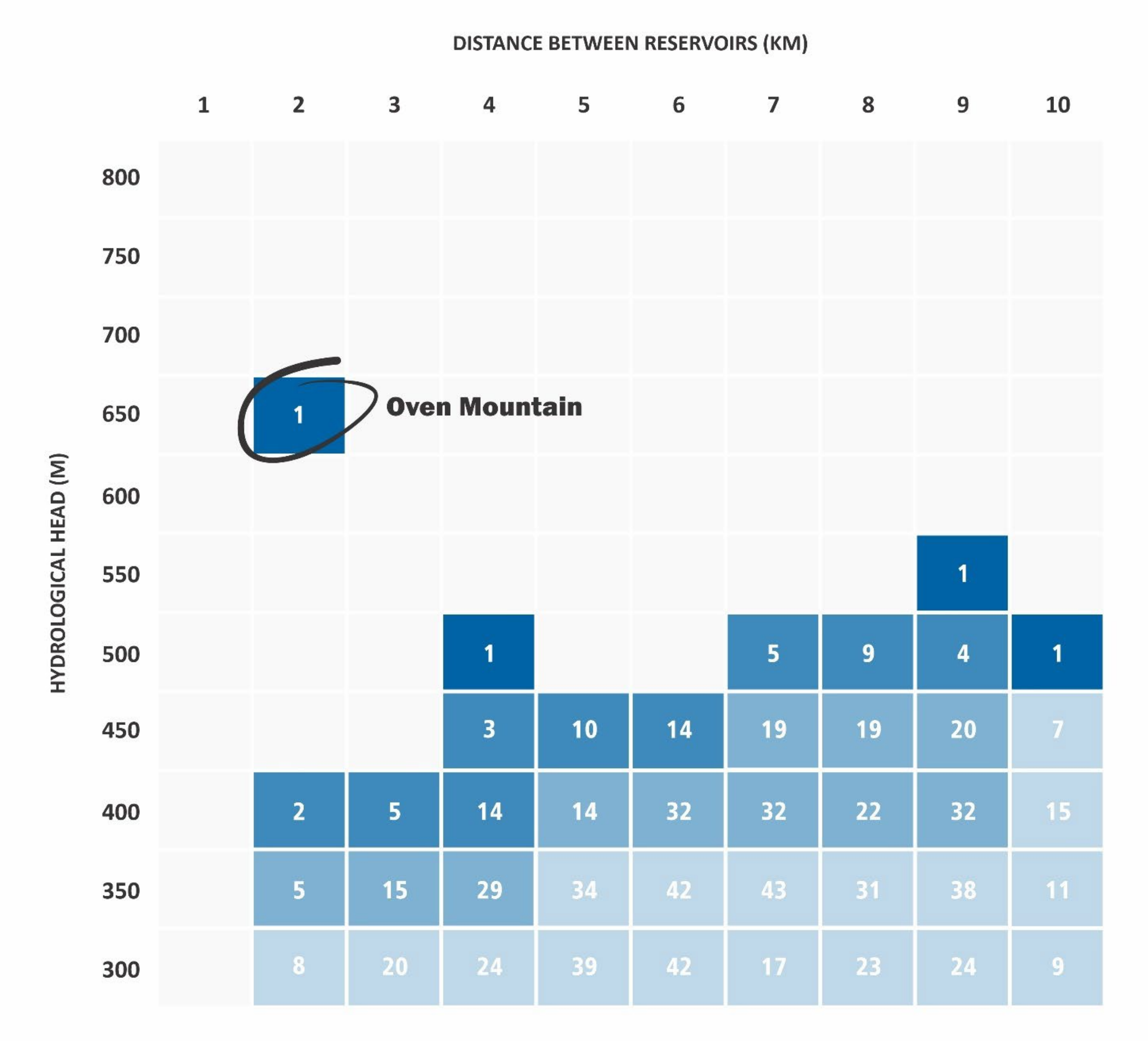



**Figure F.9 Hydraulic head and distance between reservoirs comparison**

### b Reservoir location and storage capacity

Screening of design options also occurred at a finer level of detail to select the optimal dam and reservoir configuration for the Project within the Project area. Four configurations were considered, all of which shared the same lower dam and reservoir location. These options were:

- Base Case – 600 MW, 7 hour. This option was used to confirm and compare to the SMEC 1997 arrangement.
- Base Case Expanded – 600 MW, 12 hour. This option expanded the available energy from the Base Case by raising the crest of the upper and lower dams to gain more live storage.
- Option 1 – 600 MW, 12 hour. Option 1 was the first alternative to the base case which attempts to gain more head on the project, with an upper dam on Broad Crossing Creek.
- Option 2 – 600 MW, 12 hour. Similar to Option 1, Option 2 seeks to find opportunities to increase the gross head with an upper dam on the upper reaches of Peach Tree Creek.

The screening of these options drew upon the 1997 SMEC reports, recent LiDAR topographic data, geology interpretation and hydrology analysis. Technical and environmental constraints were also considered during this process, with unstable and ecologically sensitive areas for the upper reservoir being removed from consideration. The second alternative for the upper dam and reservoir was the option selected following additional screening and study of its feasibility, with the greater volume of the upper reservoir allowing for superior energy storage without incurring significantly greater adverse environmental or social impacts.

Only one lower reservoir location was selected due to the unique topographic relief of the area presenting a desirable combination of narrow gully entrance to a broader upstream depression.

A hydroengineering study of the upper elevations yielded the two additional candidate reservoir locations, Option 1 and Option 2. Both offered higher hydrological head than the 1997 upper reservoir.

The Option 1 reservoir was initially attractive from an engineering perspective, providing higher hydrological head as well as increased storage capacity for the scheme. Further consultation with turbine suppliers identified an upper operational hydrological head limit on reversible Francis pump-turbines. In order to exploit the improved head of Option 1 would require transitioning to a more expensive Pelton type turbine.

Preliminary environmental assessment identified the Option 1 reservoir was environmentally constrained. Consequently Option 1 was not further pursued.

The Option 2 reservoir presented a higher hydrological head than either the base case or Option 1, at approximately 740 m. Similar to Option 1, this would require transitioning to a more expensive pump-turbine in order to exploit this additional head.

Keeping the upper and lower reservoirs on the same waterway allows for enhanced water management control during high rain events, floods or operational emergencies. Option 2 would have the upper and lower reservoirs on separate waterways, Option 2 was not pursued further.

Additional assessment of the Base and Expanded Base cases was made, noting the latter allows for longer duration storage. The Expanded Base case was pursued, resulting in the current storage design.

### c Shallow Connection

To incorporate the Project into the NEM, a transmission line is required to connect into the declared shared network (essentially the existing or planned NEM transmission network). Candidate sections of the declared shared network nearby to the Project were assessed and include:

- The 132 kV Transgrid line 965 spanning Armidale to Kempsey, at the northern end of the Project area.
- The 132 kV Transgrid line 96C spanning Armidale to Coffs Harbour, approximately 35 km north of the Project area.
- The 132 kV Transgrid line 966 spanning Armidale to Koolkhan, approximately 35 km north of the Project area.
- The 330 kV Transgrid line 87 spanning Armidale to Coffs Harbour, approximately 45 km north of the Project area.
- Directly back to the Transgrid Armidale substation, approximately 52 km northwest of the Project area.

The assessment, which included capital cost, impact on environmentally sensitive locations, impact on potential stakeholders, resulted in TransGrid line 965 being selected as the target connection to the declared shared network.

As Line 965 approaches the northern end of the Project area, it aligns approximately north-west to south-east in orientation. Terrain, environmental constraints and orientation essentially limit practical points of connection to between approximately Smiths Bluff in the east to Georges Creek in the west.

Three candidate routes were considered for the shallow connection between the pumped hydro system and Line 965. All three candidates follow a similar path north towards Georges Junction and are constrained to the east by the Carrai escarpments.

The concept design requirement parameters comprised two line alignments co-located between the pumped hydro system location and Line 965. One line would be for a double circuit, single 330 kV lattice tower arrangement while the other would be for a single circuit 132 kV lattice tower or monopole arrangement. Further, consideration of a substation allowing for the transformation of voltages and switching of power proximate to each potential point of connection was undertaken. These design parameters provide a conservative footprint and impact, but allow for limited but necessary flexibility in siting a substation/switching station.

Concept engineering designs confirm that each of the three potential routes and associated infrastructure is viable for the required connection to Line 965.

While each candidate alignment is viable, the chosen alignment was ultimately selected in to minimise amenity impacts.  It is also shorter than the other proposed alignments.

### iii Ongoing design refinements

Development of hydropower projects is an iterative process as changes to parameters or elements subsequently require changes to other elements. This iterative approach is typical for hydropower and pumped hydro system projects, where the design is progressively refined as more information becomes available, for example geotechnical data that becomes available during geotechnical drilling and surface mapping exercises. The iterative design process continues throughout all design stages of the Project, from preliminary designs through to detailed design. Some of the significant refinements to the 1997 design include the following:

- turbine submergence
- turbine sizing and number
- power waterway number, alignments and sizing
- arrangement of the surface options (reservoirs)
- sizing and design of intakes.

The 1997 design represented a concept level design based on information, data and regulatory requirements available at that time. These have included the results of a geotechnical campaign and concept dam wall abutments and the upper reservoir; paper topographic maps to 10 m resolution; estimates of water records; and national parks constraints.

Work undertaken by OMPS has confirmed and improved upon the foundation data through capture of aerial LiDAR and photography data (to 3 centimetre (cm) accuracy); a site intrusive campaign targeting geotechnical and hydrogeology understanding; field surveys for ecological, archaeological and associated subjects; access to greater datasets such as surface water; consultation with nearby stakeholders; stated government need on long duration storage projects; and more.

The design integration and assessment (DIAA) approach undertaken during the preparation of this EIS has iterated fundamental engineering design with learnings obtained from various surveys and interpretations, with the design evolution responding to this feedback cycle. Examples of response include change in the access road alignment between the upper and lower components of the project to mitigate impacts to ecological feedback, sourcing of construction materials from site to minimise road transport; and incorporation of drought resilience within the reservoir design to ensure the Project can continue to operate throughout lengthy periods of low rainfall.

Much improvement has been made to the design since 1997. The next level of detailed design is typically referred to as the Reference Design and will pave the way for construction.

#### iv The 'do nothing' option

The direct consequence of not proceeding with the Project would be to forego the benefits of the Project associated with:

- loss of opportunity to reduce greenhouse gas (GHG) emissions in the electricity generation sector and contribute to State and Commonwealth climate change emissions reductions commitments
- loss of vital long duration storage and firming capacity for VRE which contributes to electricity network reliability and security benefits
- loss of a major generation and storage project for the declared 8 GW New England REZ that has been determined as being critical to NSW by the Minister for Planning
- loss of a superior pumped hydro site and its attendant potential to reduce electricity prices
- loss of direct and indirect social and economic benefits, including regional employment and investment, and increased demand for local goods and services.

Doing nothing would avoid the direct environmental impacts that may occur as a result of the construction and, to a much lesser extent, operation of the Project. These include construction noise, dust, traffic and visual impacts. However, these impacts are considered manageable and would not likely result in substantive negative impacts to the environment or the local community over the medium and long term.

Given the clear benefits of the Project and the acceptability or manageability of environmental impacts, the 'do nothing' is not the preferred option from a strategic, economic, social and environmental aspect.

### F.1.7 Key benefits of the Project

The Project is one of the largest proposed renewable energy projects in Australia. If approved, the NEM will be served with up to an additional 900 MW of generating capacity and, depending on the ultimate generation capacity, up to 12 hours of energy storage. The key benefits of the Project are summarised as follows:

- it would make a significant contribution to the continued decarbonisation of the economy
- it provides large-scale energy storages at least cost to allow more flexibility to respond to seasonal variability when compared to other VRE generators and batteries
- it will improve the overall efficiency and stability of the NEM by absorbing and storing excess energy from the system at times of excess demand (through pumping) and generate at the critical times of peak demand
- provide essential grid services to support system stability and security

- being a closed system (i.e. off river), the Project can move water between reservoirs and not rely on natural inflows that may vary seasonally, offering valuable seasonal storage and insurance against drought risk
- depending on the ultimate capacity of the plant, it will have the capability to run for up to 12 hours continuously before it needs to be 'recharged'
- it will contribute social and economic benefits to the nearby communities, including employment and business investment opportunities to locals
- it has a 100 year design life and will operate for generations to come
- improved firefighting through improved and long-term road and water access, and communications.

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