bd infrastructure

Social and Economic Impact Assessment

Muswellbrook Battery Energy Storage System

Disclaimer

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Contents

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List of tables

List of figures

Glossary of abbreviations

Term	Definition
ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
Applicant, the	Firm Power
BESS	Battery Energy Storage System
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
DIDO	Drive-In-Drive-Out
DPE	Department of Planning and Environment NSW (nee. Department of Planning and Environment NSW)
EIS	Environmental Impact Statement
EIA	Environmental Impact Assessment
EPA	Environment Protection Authority NSW
FIFO	Fly-In-Fly-Out
GW	Gigawatts
Ha	Hectares
HV	High voltage
Hunter Valley Region	Hunter Valley excluding Newcastle SA4
ICNG	Interim Construction Noise Guideline
IRSAD	Index of Relative Socio-economic Advantage and Disadvantage
kV	kilovolts
LGA	Local Government Area
LSPS	Local Strategic Planning Statement
MSC	Muswellbrook Shire Council
MW	Megawatts
MWh	Megawatt hours
NSW	New South Wales
Proposal, the	Muswellbrook Battery Energy Storage Systems
REZs	Renewable Energy Zones
RBA	Reserve Bank of Australia
SEARs	Secretary's Environmental Assessment Requirements

Term	Definition
SEIFA	Socio-economic Index for Areas
SIA	Social Impact Assessment
SSD	State Significant Development

Executive summary

bd infrastructure was engaged by Firm Power (the Applicant) to prepare a Social Impact Assessment (SIA) and Economic Impact Assessment (EIA) for a Battery Energy Storage System (BESS) at 20-24 Sandy Creek Road, Muswellbrook, in the Muswellbrook Shire Council (MSC) Local Government Area (LGA). The SIA and EIA are to inform a State Significant Development (SSD) application for the Muswellbrook BESS (the proposal).

Social Impact Assessment

Assessing social impacts

SIA is an assessment approach that considers the social impacts and benefits of a proposal. Unlike other technical assessments, SIA goes beyond considering biophysical impacts by placing people at the centre of the assessment process. SIA strives to mitigate impacts and enhance benefits.

A best practice approach to SIA has been adopted for the proposal, that integrates international and New South Wales (NSW) social guideline requirements and has involved a number of key phases. Engagement with the community has been a key component of the SIA program, including local residents, developers and regional stakeholders in the identification of social impacts and strategies to address (negative) and enhance (positive) proposal impacts.

The level of social impact associated with a potential impact/benefit is assessed based on its magnitude and likelihood. This SIA has utilised the assessment methodology outlined in the Department of Planning and Environment's (DPE) SIA Guideline: Technical Supplement (2021), which is included in Table 1-1 below.

Table 1-1 Department of Planning and Environment's assessment methodology summary

	1	2	3	4	5
Likelihood	Minimal	Minor	Moderate	Major	Transformative
A Almost certain	Low	Medium	High	Very high	Very high
B Likely	Low	Medium	High	High	Very high
C Possible	Low	Medium	Medium	High	High
D Unlikely	Low	Low	Medium	Medium	High
E Very unlikely	Low	Low	Low	Medium	Medium

Potential impacts and benefits

The SIA assesses both the unmitigated and mitigated social impacts and benefits. The predicted impacts are primarily expected to be direct and localised, which isn't surprising given the nature of the proposal and the location next to the established Ausgrid facility. Social impacts relating to way of life (how people work, rest and play) and health and wellbeing were the prominent impacts identified however with the consideration of mitigation measures, the residual impact is expected to be low in all instances.

It was also identified that the proposal would result in benefits to the wider community in terms of the construction workforce needs and network resilience, as employment and business opportunities would continue to flow to the surrounding region and these benefits would not occur should the proposal not proceed.

The Applicant has responded to potential impacts through proposal refinement measures including the provision for 3-metre noise barriers and vegetation screening. These refinements specifically consider:

- the close proximity of current and future residents to the proposal site
- valued rural lifestyle and scenery of the local area.

Key social impacts and benefits identified as having a potential notable impact/benefit as a result of the proposal are summarised in Table 1-2 below. These impacts and benefits are assessed in detail in Chapter 5.

Table 1-2 Summary of assessed social impacts and benefits

Social impact	Impact to people	Nature	Social impact category	Residual mitigated impact rating
Traffic	Temporary changes to how road users move around the local area due to construction traffic	Negative	Accessibility, Way of life	Low (C1)
Noise	Temporary decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to noise annoyance during construction	Negative	Health and wellbeing, Way of life	Low (C1) (local residents, including shift workers)
Air quality	Temporary and localised potential decline in air quality due to construction dust	Negative	Health and wellbeing	Low (A1)
Workforce need	Additional access to employment opportunities in the local area	Positive	Livelihoods	Medium (C3)
Network resilience	Reduction if the likelihood for a blackout in the area, overall reducing health and wellbeing risks associated with moderate blackout events	Positive	Health and wellbeing	N/A
Operational noise	Decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to operational noise annoyance	Negative	Health and wellbeing, Way of life	Low (C1)
Visual	Permanent changes to the aesthetic value of the area	Negative	Surroundings	Low (D2)

A number of mitigation measures are identified to address the social risks including:

- development and implementation of a local procurement policy which aims to engage the local construction workforce and relevant suppliers
- a commitment to develop a complaints handling protocol prior to the commencement of construction
- further development of the proposal website to be a central source of information and to include:
  - a summary of all environmental and social impacts, with the associated committed actions and mitigation measures adopted through the EIS process
  - links to all publicly available relevant proposal information
  - clear contact details to support a complaints handling protocol
- noise management measures developed in consultation with potentially impacted sensitive receivers
- establish clear lines of communications with projects teams responsible for the management and delivery of the Muswellbrook Bypass in order to manage cumulative impacts
- support the adoption of all technical mitigation measures identified in other technical assessments.

Economic Impact Assessment

Assessing economic impacts

This EIA utilises an input-output (IO) methodology and associated software. IO analysis is a form of macro-economic analysis which considers the economic interaction between industries within an economy. Based on inter-industry interactions, IO analysis seeks to understand the direct and indirect economic impacts of investment. Through tracking the investment impact of one dollar (or one job) across an economy, IO analysis models how economic investment may be distributed and stimulate other industries within an economy (multipliers).

For this EIA, the following indicators have been used to assess the potential economic benefit of the proposal:

- project expenditure
- employment benefits
- value-added benefits.

Collectively, these indicators will quantify:

- direct and indirect employment benefits (job creation) associated with construction and operation
- direct and indirect value-added during construction and operation.

The EIA assesses potential economic impacts at the Regional (Hunter Valley excluding Newcastle)) and State scale (New South Wales).

Potential economic impacts

The proposal has the potential to generate a range of economic benefits within the Hunter Valley Region and NSW economies. These include:

- 34-68 direct and 10-18 indirect construction services jobs (full time equivalent (FTE)) and $4.627-$9.254 million direct and $1.206-$2.611 million indirect value-added to the Hunter Valley Regional economy over the 12-month construction phase
- 68 direct and 18 indirect construction services jobs (FTE) and $9.254 million direct and $3.426 million indirect value-added to the NSW economy over the 12-month construction phase
- 2-3 direct and 3-4 indirect electricity distribution jobs (FTE) and $1.271-$1.907 million direct and $0.925-$1.388 million indirect value-added per annum to the Hunter Valley Regional economy during operation phase
- 2-3 direct and 8-12 indirect electricity distribution jobs (FTE) and $1.137-$1.706 million direct and $2.021-$3.030 million indirect value-added per annum to the NSW economy during operation phase.

In addition to employment benefits and increased value-added, the proposal is anticipated to:

- directly strengthen and support the construction industry within the Hunter Valley Region, an important industry of employment for residents
- provide new employment opportunities in the electricity distribution industry, supporting economic diversification in the Region while supporting the Region's vision to remain an energy production hub
- indirectly support future capital investment in renewable energy projects in the Region and across NSW, further stimulating Regional and State economies
- indirectly support the viability of cheaper electricity generation cost sources, such as wind and solar, by contributing to network firming with the potential to provide cheaper household electricity costs to households in the Region, and to a lesser extent NSW.

1 Introduction

1.1 Project description

The Applicant is proposing to develop a BESS with a delivery capacity of 150 Megawatt (MW) and a useable energy storage of 300 Megawatt hours (MWh) on land adjacent to the Ausgrid Muswellbrook substation. The proposal is known as the Muswellbrook BESS (referred to within the proposal). The proposal is in NSW, approximately 2.5 kilometres north-east of the town of Muswellbrook.

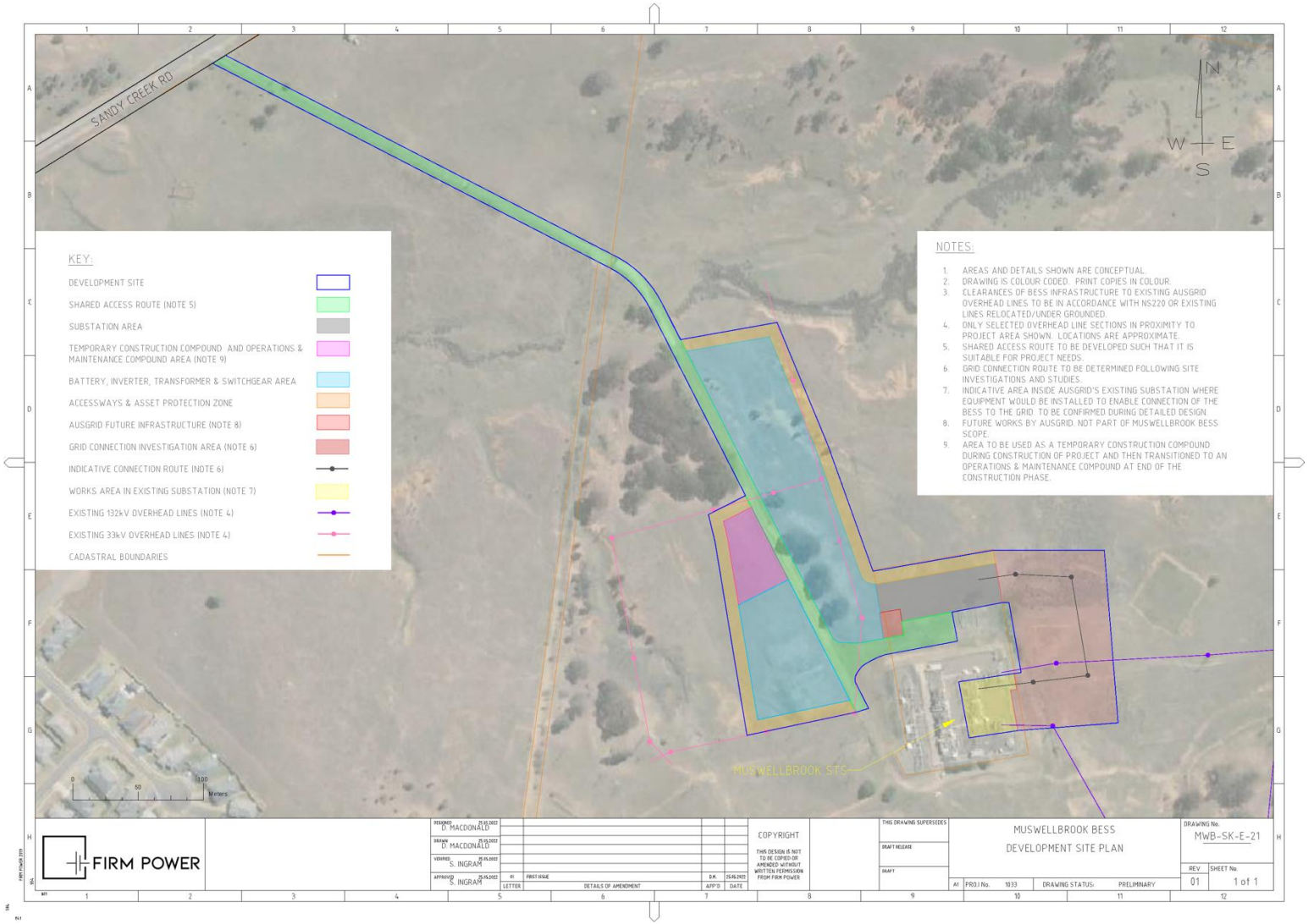
The subject site is at 20-24 Sandy Creek Road, Muswellbrook in the MSC LGA. The site has a development area of approximately 4.94 hectares.

The Muswellbrook BESS includes the following key infrastructure:

- enclosed lithium-ion batteries
- power conversion systems including associated switchgear, protection and control equipment, transformers and enclosures for housing equipment
- underground power and fibre optic cabling interconnecting the equipment
- grid connection equipment including main power transformer, switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary/earthing transformers and enclosures/buildings for housing equipment
- underground or overhead 132kV sub-transmission lines to connect the BESS to the Muswellbrook substation
- earthing and lightning protection systems
- site office, storage area/enclosure, internal access tracks, on-site parking, security fencing, CCTV, lighting and temporary construction laydown area
- vegetation screening and noise walls
- utilisation of existing site access arrangements.

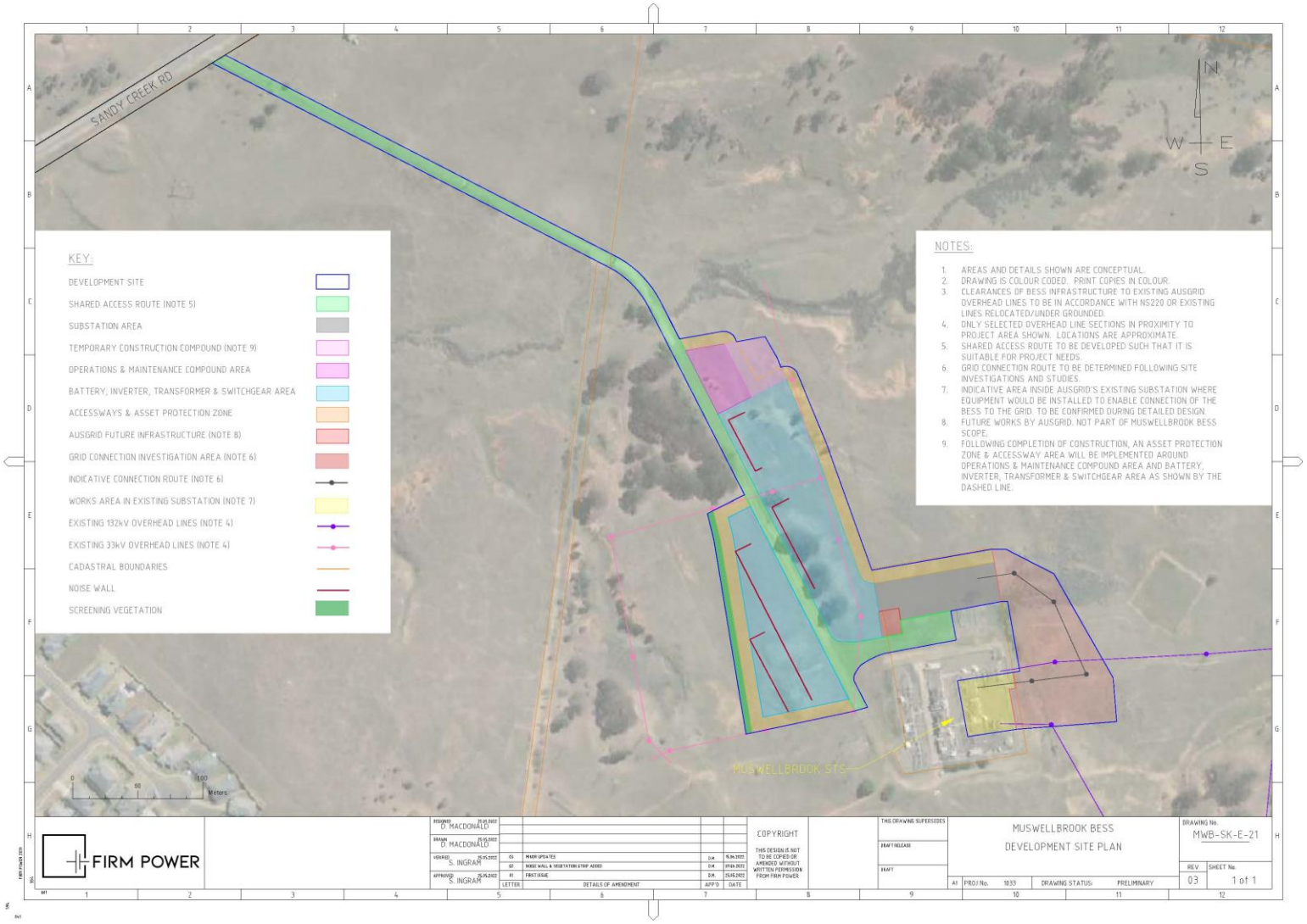
Figure 1-1 and Figure 1-2 below reflect the site layout of the proposal.

Figure 1-1 Initial proposal site layout (1 of 2)



Source: Premise Australia, EIS: Muswellbrook Battery Energy Storage System, 2022

Figure 1-2 Confirned proposal site layout, including mitigation measures (2 of 2)



Source: Premise Australia, EIS: Muswellbrook Battery Energy Storage System, 2022

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Proposal context

1.2 Proposal activities

1.2.1 Construction

Construction activities include offsite manufacturing of batteries, the delivery and installation of batteries, site preparation including levelling of the site and constructing a bench on which to install the BESS. The primary components associated with the installation of the BESS are as follows:

- site investigations, vegetation clearing, levelling, bench and access way construction, drainage system installation and installation of foundations/supports on which to install equipment
- transport to site and installation of equipment
- testing and commissioning of the equipment
- operation and maintenance.

It is anticipated that the construction of the proposal will take approximately 12 months and require a peak construction workforce of the equivalent to 75 full-time employees.

1.2.2 Operation

The proposed BESS would be available to operate 24 hours a day, seven days a week with a lifespan of 20 years. Actual operation of the BESS would be dependent on electricity system needs, which are communicated through pricing signals in the National Electricity Market. However, it is conceivable that the infrastructure may be upgraded rather than decommissioned and the lifespan extended.

Key operational activities will include operation of the BESS, charging and discharging of the BESS, onsite maintenance, and emergency maintenance. A summary of operational activities is provided in Table 1-1 below. It is expected that the operation of the Muswellbrook BESS would generate the need for two-to-three full-time employees over the 20-year operational period.

Table 1-1 Operational activities

Operational activity	Description
Operation of BESS	• operation of the BESS (monitoring and controlling) will be undertaken remotely
Recharging and discharging of BESS	• it is anticipated that the batteries will discharge and recharge twice a day
On-site maintenance	• monitoring, testing and maintenance of onsite equipment • receipt of goods • removal of waste • other general site maintenance (e.g. care of ground cover and vegetation)
Emergency maintenance	• emergency site maintenance

1.2.3 Decommissioning

Decommissioning activities include removal of infrastructure and site remediation. Key decommissioning activities are summarised below in Table 1-2.

Table 1-2 Decommissioning activities

Decommissioning activity	Description
Removal of infrastructure	• the above ground equipment would be un-bolted from the concrete slab and removed by crane onto transporters and taken away from site to an appropriate recycling or waste facility • underground services would be cut back to below ground level and capped
Site remediation	• the site would then be landscaped to a safe, clean and stable state • a decommissioning arrangement has been established with Ausgrid to provide assurance for the decommissioning components described above.

2 Setting the scene

2.1 Statutory requirements

The proposal is classified as a SSD under the State Environmental Planning Policy (Planning Systems) 2021 and the applicable consent authority for the proposal is the NSW Minister for Planning or the Minister's delegate. The Planning Secretary's Environmental Assessment Requirements (SEARs), issued 10 December 2021, have informed the preparation of an EIS in support of a SSD application submitted under Part 4 of the Environmental Planning and Assessment Act 1979 (the EP&A Act).

The SEARs requested the EIS address a range of key issues, which included but was not limited to:

- an assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPE, 2021)
- an assessment of the economic impacts or benefits of the proposal for the region and the State as a whole.

This SIA and EIA respond directly to these SEARs.

2.2 Approval process

As demonstrated in Figure 2-1, the Applicant has already:

- submitted a Scoping Report to DPE
- received SEARs to guide the development of the EIS.

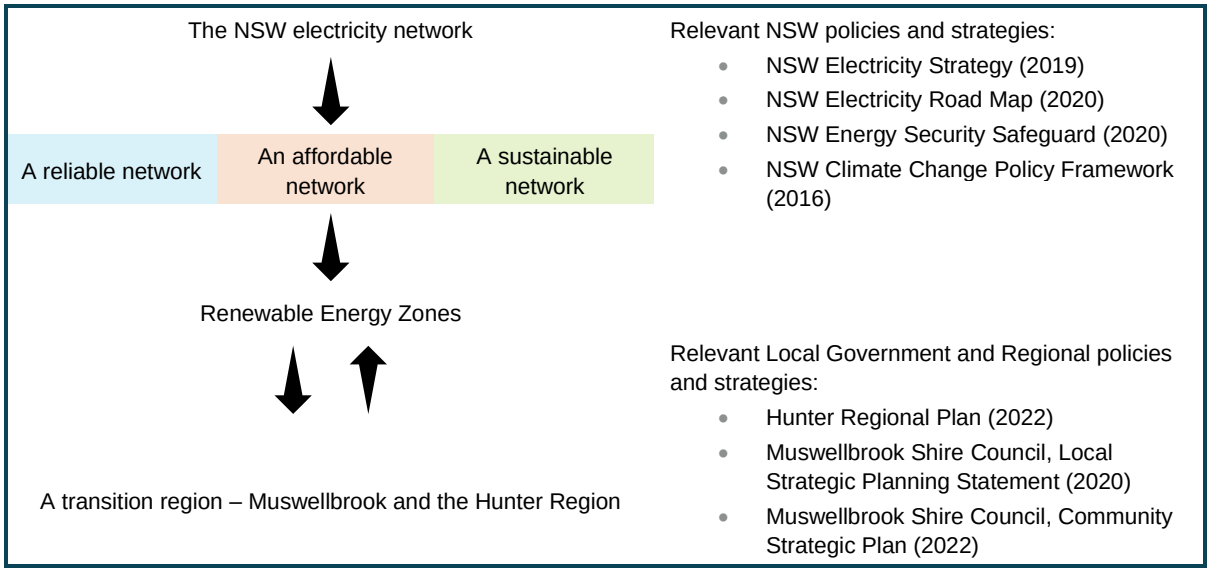
Once completed, this SIA and EIA, and broader EIS, will be placed on public exhibition for comment. The Applicant will respond to comments which arise from the public exhibition process. Once these comments have been addressed, the EIS will then be submitted to DPE for assessment and determination.

Figure 2-1 Approval process

2.3 Policy review

The policy review for this SIA and EIA has been undertaken in themes. These themes and relevant policies and strategies are shown below in Table 2-1.

Table 2-1 Policy review



2.3.1 The NSW electricity network

NSW has historically enjoyed an electricity network that has delivered cheap and reliable power to households and businesses. However, the electricity network in NSW is currently facing a range of challenges, which include:

- aging coal powered infrastructure
- high electricity prices
- increasing peak network demand
- increasing network vulnerability due to extreme weather conditions
- increase awareness and need to transition to a net zero future.

Collectively, these challenges have both increased the cost of electricity and reduced the reliability of the NSW electricity network. The NSW Electricity Strategy (2019) recognises these challenges and aims to deliver a future electricity network that is reliable, affordable, and sustainable.

2.3.2 A reliable network

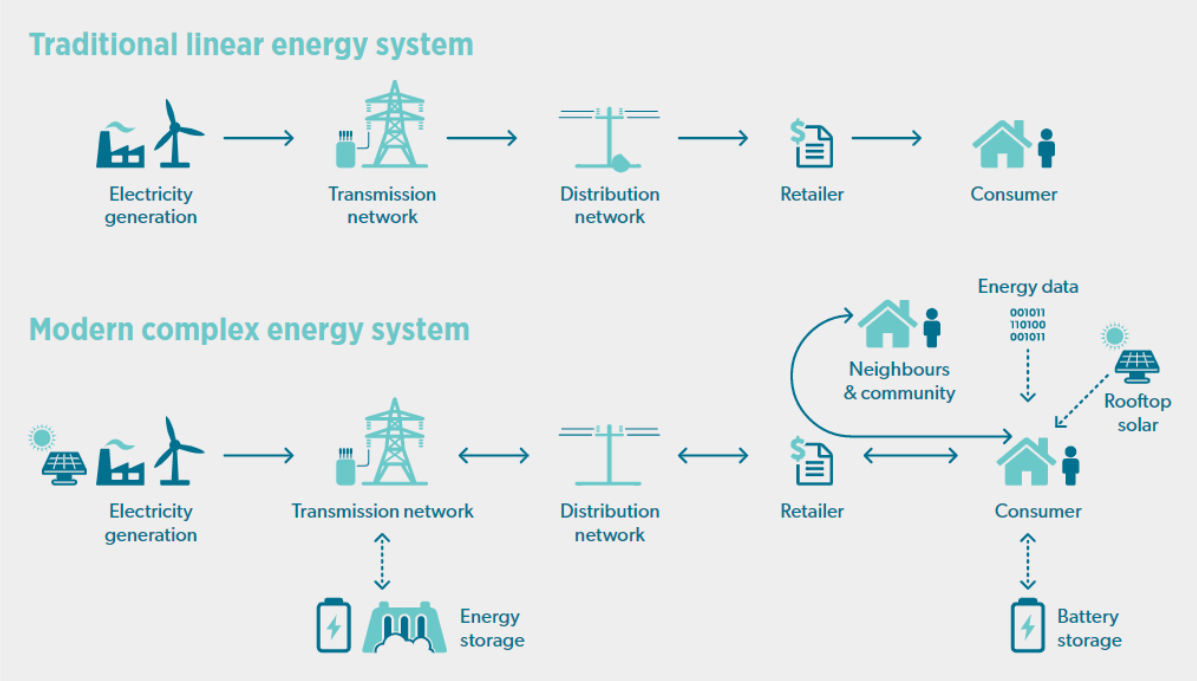
The NSW Government describes a future electricity network that is supplied by a range of energy sources. As traditional coal fired power stations begin to close, renewable energy has been identified as a key replacement due to its low cost and long-term environmental sustainability. However, in the current NSW electricity network, the supply of renewable energy has lacked reliability in peak demand periods. The Electricity Strategy (2019) positions battery storage and hydro-pumping as central to firming[1] the NSW electricity grid. The ability to store and release electricity into the grid at high demand periods is key to increasing the reliability of renewable energy.

Consequently, to support this future network, the NSW electricity network will need to transition from a traditional linear energy system to modern complex energy system. Modern complex energy systems incorporate energy

[1] *Firming refers to maintaining the output from an intermittent power source for a required length of time – in other words, making sure enough energy always available. Source: ECOS CSIRO: https://ecos.csiro.au/*

storage into the network and recognise the role of commercial, personal and community energy storage, shown below in Figure 2-2.

Figure 2-2 NSW electricity network transition



Source: NSW Electricity Strategy (2019)

2.3.3 An affordable network

There are two key components of an affordable network:

- the generation cost of energy sources
- peak demand pricing.

The NSW electricity policy landscape widely acknowledges the low generation cost of renewable energy, with the NSW Electricity Strategy (2019) stating:

> *New market-driven electricity generation should drive down prices and help protect the environment. This is because firmed renewables are the cheapest form of new reliable generation and cheaper than the current wholesale price.*

Similarly, the NSW Electricity Infrastructure Roadmap (2020) outlines the cost benefits of renewable energies, with one of the five goals being:

> *Harnessing opportunities for industry: empowering new and revitalised industries with cheap, reliable and low emissions electricity.*

These policies focus on the first point, achieving an affordable network by capitalising on cheap energy sources, such as wind and solar. Projects which increase the firmness of renewable energies, such as the proposal, are central to unlocking a more affordable electricity network for households and businesses alike.

The NSW Energy Security Safeguard (2020) speaks to the second point, outlining the need to regulate peak demand pricing, including supporting activities that reduce demand at peak times. This includes flexible demand response. Battery technology projects, such as the proposal, increase the network's ability to increase supply during peak periods, both daily and seasonally.

The proposal sits comfortably within the goals and objectives of the NSW electricity policy landscape, contributing to an affordable network by increasing the firmness of electricity networks and providing flexible demand response during peak demand periods.

2.3.4 A sustainable network

Currently, coal and gas-fired power stations are the primary source of electricity in NSW, representing 37 per cent of NSW emissions[2]. The NSW Electricity Strategy (2019) and the NSW Climate Change Policy Framework (2016) both acknowledge the need to have an environmentally sustainable energy network. The NSW Climate Change Policy Framework (2016) focuses on the need to transition to renewable energy sources to achieve the State's transition to net zero by 2050.

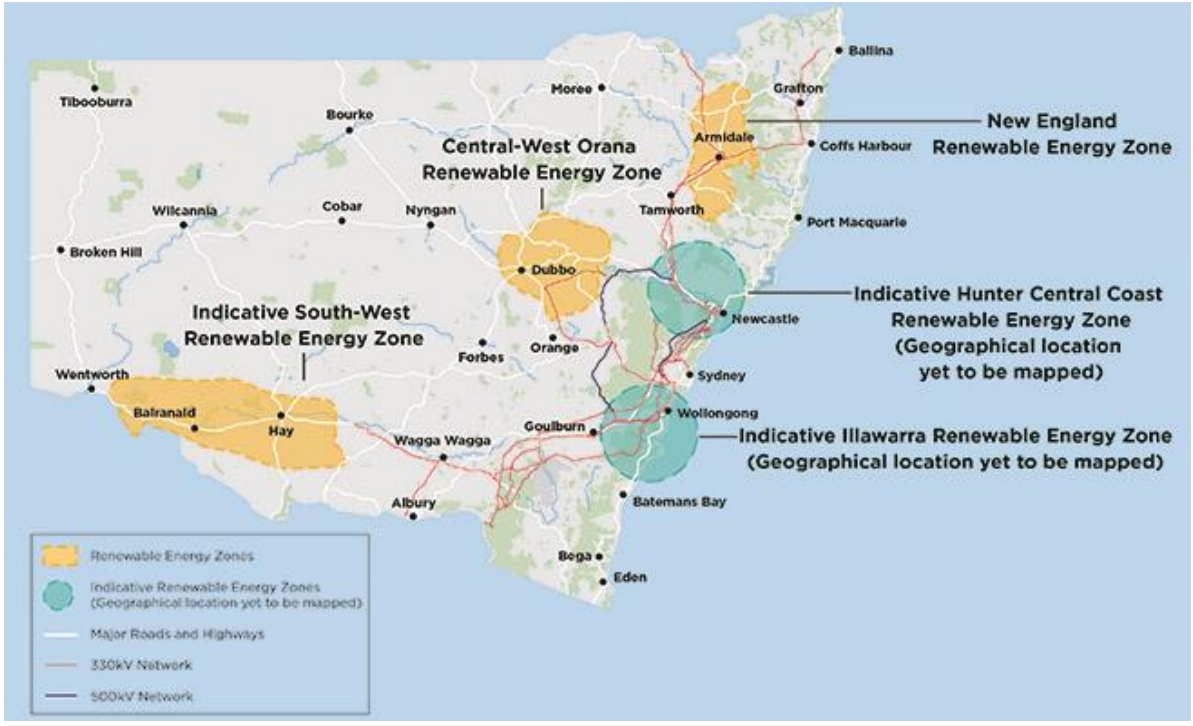
Battery storage technology is the enabling infrastructure that increases the viability of renewable energy sources. Projects such as the proposal are network investments that directly support NSW's transitions from fossil fuel energy production to more diverse energy sources. The proposal has a role to play in supporting a reliable and sustainable electricity network that viably supports renewable energy production.

2.3.5 Renewable Energy Zones

In order to achieve the Electricity Strategy's (2019) goal of a reliable, affordable and sustainable electricity network, the NSW Government has developed three Renewable Energy Zones (REZs) and two indicative REZs, shown below in Figure 2-3. REZs will generate, store and transport energy across rural NSW to metropolitan centres to meet current and future demand, transforming the NSW electricity network and rural economies.

One of the indicative REZs is the Hunter and Central Coast region. If the Hunter and Central Coast REZ is developed, the proposal will provide battery storage as part of a regional modern complex energy system.

Figure 2-3 Renewable Energy Zone locations



Source: EnergyCo NSW, Renewable Energy Zone locations

2.4 Muswellbrook and Hunter Region

2.4.1 A transitioning region

As the NSW Department of Planning and Environment and Muswellbrook Shire Council plan for the future of the Region, renewable energy is identified as an important environmental, social and economic part of this future. In

[2] *NSW Environment Protection Authority (EPA), Energy Consumption 2021*

the *Draft Hunter Regional Plan (2022)*, the vision for the Region is to be the leading regional economy in Australia with diversification and growth of the energy production section a key component of this future vision.

Similarly, Muswellbrook Shire Council's *Local Strategic Planning Statement (2020)* (LSPS) aims to achieve a more sustainable community, environment and economy through economic diversification. Council's LSPS clearly states that the generation of renewable energy in the LGA is encouraged and that the generation and distribution of sustainable energy will continue within the Shire.

Muswellbrook Shire Council's LSPS directly speaks to the economic uncertainties facing the Shire, which includes the closure of:

- the Liddell power station by 2023
- the Bayswater power station by 2033
- the soon-to-close Muswellbrook Coal Mine.

Collectively the Liddell and Bayswater power stations supply over 600 jobs to the Region, while mining is a major industry of employment in the Muswellbrook Shire. These documents signal that the NSW Government and Muswellbrook Shire Council are both supporting and encouraging investment in the renewable energy sector in the LGA and Region. Muswellbrook Shire Council's *Community Strategic Plan (2022-2023)* (CSP) also identifies these Regional challenges, noting the need to build economic resilience and growth of other industries (away from thermal coal and mining).

Key outcomes from Muswellbrook Shire Council's CSP engagement are summarised below, highlighting some of the challenges associated with regional changes.

The future of coal and mining in the shire:

46 per cent of people think the Shire should *diversify away from coal*

37 per cent of people think the Shire should c*ontinue to focus on mining*

Other key challenges and concerns include:

- concerned about the uncertain future of the coal industry and coal-fired power generation (28 per cent)
- related job insecurity or unemployment 16 per cent.

The proposal aligns with state and local government policy objectives and indirectly supports the investment of renewable energies.

2.5 National and international context

In addition to the challenges identified in the policies and strategies above, 2022 has seen electricity prices in NSW and Australia significantly rise. In May 2022, the NSW short-term wholesale price of electricity was reportedly 80 per cent higher than in 2021[3] while National wholesale energy prices had increased 140 per cent in 12 months[4]. The Australian Energy Regulator (AER) also announced an 18.3 per cent increase to benchmark electricity price, taking effect in July 2022, expected to further increase the price of electricity.

In June 2022, for the first time since its establishment, the Australian Energy Market Operator (AEMO) suspended wholesale spot market trading on the East Coast of Australia to ensure reliable supply[5]. Price caps, implemented by AEMO to limit rising electricity costs, resulted in unprofitable conditions for electricity generators. Consequently, electricity generators withdrew from the energy market, reducing supply in a period of notably high demand[6].

3 Bruce Mountain, The Conversation, Electricity prices are spiking ten times as much as normal, here are some educated guesses as to why, May 11, 2022
4 Daniel Mercer and Emilia Terzon, ABC News, Power prices to surge up to 18.3 per cent as energy market turmoil flows through to households, 26 May, 2022
5 *AEMO, Emergency Management: Guide to Market Suspension in the NEM, 2022*
6 *AEMO, Emergency Management: Guide to Market Suspension in the NEM, 2022*

A key driver in State and National electricity prices have been the increasing cost of fossil fuel energy sources, geopolitical instability and conflict in the Ukraine have restricted Russian exports of petroleum, coal and gas[7]. The cost of living in NSW has also continued to increase with electricity being one of many household costs on the rise (alongside petrol[8], interest rates[9], housing[10], HECS debt indexation[11] and food[12]). Paired with limited wage growth across the State, the cost of living is currently rising faster than wages, placing increasing pressure on households[13].

Overall, the reliability of electricity supply in NSW is highly strained, while consumer electricity costs and general costs of living are on the rise, placing increasing pressure of businesses and households.

2.6 Development context

The Muswellbrook BESS is proposed on a largely cleared site adjacent to an existing Ausgrid substation. The site is accessed via an existing access driveway servicing the substation which connects to the public road network at Sandy Creek Road. There are a range of landholders, stakeholders, residential and non-residential properties within moderate proximity to the proposal. These include:

- seven residential properties within 400 metres of the site (with the closest being 370 metres distant)
- 26 residential properties within 500 metres of the site
- 135 residential properties located between 500 metres and one kilometre of the site
- future residents associated with the Northview Estate development
- a Jehovah's Witness Kingdom Hall 605 metres north of the site
- the Muswellbrook waste management facility 500 metres south-east of the site
- the Muswellbrook Coal Mine is located approximately 1.7 kilometres east of the site
- the future alignment of the Muswellbrook Bypass east of the site.

7 Tim Nelson and Joel Gilmore, The Conversation, Energy bills are spiking after the Russian invasion. We should have doubled-downed on renewables years ago, 21 March, 2022

8 Daniel Mercer, ABC News, Hip pocket pain at the bowser as fuel above $2 a litre prompts pleas from motoring groups, 24 May, 2022

9 Reserve Bank of Australia, Statement by Philip Lowe, Governor: Monetary Policy Decision, 3 May, 2022

10 Australian Bureau of Statistics, Residential property price indexes: eight capital cities, 15 March, 2022

11 Australian Taxation Office, Study and training loan indexation rates, 12 May, 2022

12 Emily Terzon, ABC News, Price rises are hitting consumers as inflation takes off. These are some items that are going up now, 23 March, 2022

13 Daniel Mercer and Emilia Terzon, ABC News, Power prices to surge up to 18.3 per cent as energy market turmoil flows through to households, 26 May, 2022

Figure 2-4 Proposal context

Source: Premise, Environmental Impact Statement: Muswellbrook Battery Energy Storage System, 2022

2.6.1 Northview Estate

Northview Estate is a greenfield residential development, being developed by Tindale Property, west of the proposal. Northview Estate includes a total of 138 residential lots across 43 hectares, with lot sizes ranging from 750 sqm to 5,700 sqm. The development will be delivered in 7 stages, with stages 1, 2 and 3 already completed. Stage 7 of Northview Estate is in the early planning stages and is yet to begin the Development Application process with Muswellbrook Shire Council.

During May and June of 2022, the Applicant and Tindale Property engaged in discussions regarding the proposal. During these discussions, Tindale Property identified concerns regarding future land releases and the operational impacts of the proposal (specifically noise impacts and visual amenity). The Applicant refined the proposal design to include noise and visual mitigation measures (noise barriers and vegetation screening) in direct response to these concerns. It is anticipated that the inclusion of noise barriers in the proposed design will reduce noise impacts and visual impacts on future residents of Stage 7. Cumulative impacts and potential impacts on future residents are explored further in Section 5 of this SIA.

2.6.2 Muswellbrook Bypass

The NSW Government has committed $266 million to fund the New England Highway bypass of Muswellbrook (hence referred to as the Muswellbrook Bypass). The proposed Muswellbrook Bypass includes nine kilometres of new highway with a single lane in each direction and a 100km/h speed limit. As shown in Figure 2-5, the Muswellbrook Bypass will come within close proximity of the existing Ausgrid substation.

The Muswellbrook Bypass aims to:

- improve network efficiency on the New England Highway, particularly travel times for long haul freight movements
- improve safety for all road users in the Muswellbrook town centre, particularly relating to heavy and light vehicle interactions
- improve the amenity of the Muswellbrook township.

Enabling works are expected to begin in late 2022, with main works commencing in 2023. It is anticipated that the construction period of main works will take 3.5 years. The Applicant has consulted with Transport for NSW during the development of the Scoping Report and the EIS for the Muswellbrook BESS to share information about design and delivery and to assist with the identification of any cumulative impacts. The site layout presented in Figure 1-1 and Figure 1-2 includes minor amendments to avoid potential design conflicts with the proposed bypass which were identified through this consultation.

Figure 2-5 Proximity of the New Englang Highway Muswellbrook bypass to the existing Ausgrid substation

Source: Transport for NSW, Muswellbrook bypass: Overview video, https://caportal.com.au/tfnsw/muswellbrook

2.6.3 Summary of development context

The immediate area surrounding the proposal is expected to undergo significant change over the next 5 years. The Northview Estate will see new residential development to the west of the site and the Muswellbrook Bypass will see new road infrastructure to the east. It is anticipated that these projects will have competing needs and expectations and will generate changes in the local area differently.

The Muswellbrook Bypass will likely:

- generate construction amenity impacts across both a long geographical scale and timeframe
- introduce a new source of noise, light and air quality impacts to the locality during operation
- have significant visual impacts.

The Northview Estate will likely:

- introduce new residents into the locality, who may be sensitive to noise, light and air quality impacts. However, it is expected that development stages 7 will include some large lot residential properties and be at a lower density than earlier stages
- be potentially negatively impacted by noise, changes to the local landscape, and visual impacts.

To better understand the overlap of these projects and potential cumulative impacts, Table 2-2 compares the construction timings.

It is expected that the proposal will have relatively low construction impacts as:

- the development footprint is relatively small, particularly when compared to the Muswellbrook Bypass and Northview Estate
- the proposal is occurring adjacent to an existing substation site rather than a new site (brownfields)
- the batteries will be assembled offsite, limiting the amount of construction occurring onsite
- the proposal has a relatively short construction period (12 months with a peak construction period of five months)

- the noisiest works would be intermittent, only occurring for a few weeks at a time over the peak construction period.

The construction of the proposal may occur during a period of notable local construction, including construction of the Muswellbrook Bypass and future stages of the Northview Estate development. While the proposal is expected to have comparatively limited construction impacts, some construction activities may contribute to cumulative impacts across the local area, specifically due to construction related dust, traffic, noise and disruption to local landscapes and vistas.

The operation of the proposal will likely coincide in majority with the operation of the Muswellbrook Bypass. While the proposal is expected to have comparatively limited operational impacts, operation of the proposal may contribute to cumulative impacts in the local area predominately due to disruption to local landscapes and vistas.

Table 2-2 Development context summary

Project	2022		2023		2024		2025		2026		2027	
	Jan-May	June-De	Jan-May	June-De	Jan-May	June-De	Jan-May	June-De	Jan-May	June-De	Jan-May	June-De
Muswellbrook Bypass												
Muswellbrook BESS												

Legend	
	Enabling works
	Main construction
	Project operational

**Information about the timing of development for Northview Estate stages 4 – 7 is not available.*

bd infrastructure

Social Impact Assessment

3 Social impact assessment methodology

3.1 Approach

3.1.1 Department of Planning and Environment's Social Impact Assessment Guideline

As per the SEARs, the proposal is required to undertake an assessment of social issues related to the proposal in accordance with the DPE's:

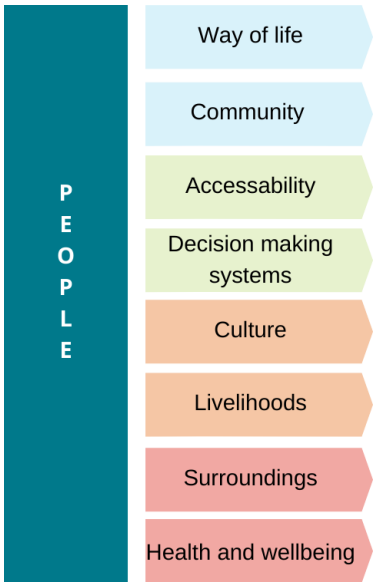
- Social Impact Assessment Guideline for State Significant Projects (2021)
- Technical Supplement: Social Impact Assessment Guideline for State Significant Projects (2021).

3.1.2 Social impact categories

This SIA has utilised the eight social impact categories identified by DPE.

The social impact categories highlight the various ways in which individuals, communities, stakeholders and groups can be impacted by a proposal. Each category represents a component of social and community sustainability. It is important to note that baseline indicators and social impacts are often relevant to more than one category, highlighting the complex and interconnected nature of social and community sustainability.

Figure 3-1 Social impact categories



Source: adapted from the NSW DPE SIA Guideline

3.2 Community and stakeholder engagement

3.2.1 Approach

Engagement undertaken for this SIA strived to be open, balanced, impartial and inclusive. For this SIA, and broader engagement surrounding this proposal, the following definitions of these principles were used:

- **Open**: provide community members and stakeholders the opportunity to express themselves, their opinions and their values in their own words
- **Balanced**: provide equal discission time and focus on negative and positive impacts associated with the proposal
- **Impartial**: research design and interviews were developed/undertaken with awareness of avoiding leading questions

- **Inclusive**: engagement activities utilised a range of mediums (face-to-face, mail, 1800 number and digital) to ensure community members and stakeholders could provide feedback and ask questions. Engagement methods for interviews were also adapted on a case-by-case basis to meet the needs of participants.

These principles were realised through the community survey and interviews through research design. In the community survey, openness was achieved through open responses. Provisions for open responses were included as choice questions allow respondents to raise additional points which were not represented in the choice questions. The community survey and interview guides were designed to be balanced, providing equal time/number of questions for proposal related impacts and benefits. This was chosen to ensure that engagement methods did not focus on one aspect of social impact/benefit more than the other.

3.2.2 Engagement activities

Community members and stakeholders were identified through a range of methods, including:

- stakeholder mapping
- recommendations from stakeholders
- mapping local residents in close proximity to the proposal.

A full list of stakeholders engaged is provided in Appendix E.

As part of developing the Muswellbrook BESS Scoping Report, a number of engagement activities relevant to the development of this SIA and EIA were undertaken. These are highlighted in Table 3-1.

Table 3-1 Engagement activities undertaken to support development of the Scoping Report

Engagement activity	Timing	Audience and purpose
Meetings and liaison	September - October 2021	Meetings and liaison with key stakeholders including DPE, Ausgrid, Subsidence Advisory NSW, and Muswellbrook Shire Council to determine proposal feasibility and assessment requirements.
Project website	September 2021 onwards	Source of up-to-date information on the proposal for all stakeholders.
Notification letter	22 September 2021	650m surrounding the proposal site. 41 residential properties. No responses received.
Email	27-29 September	Engagement advice sent to seven regulatory bodies, and six community groups informing them of the Scoping Report development. No responses received.
Door knocking	27 October 2021	650m surrounding the proposal site. 41 residential properties. 12 residents were briefed on the proposal and potential impacts during the doorknocking.

As part of the EIS process and SIA development, the following engagement activities shown below were undertaken to understand local communities, key stakeholders and local governance strengths and challenges.

Table 3-2 Engagement activities undertaken to support the EIS and SIA

Engagement activity	Timing	Audience	Respondents
Door knocking	Friday 17 June 2022	650m surrounding the proposal site. 41 residential properties	8
Letterbox drop	Saturday 4 June 2022	1.5km surrounding the proposal site. Provided proposal fact and communication channels.	N/A

Engagement activity	Timing	Audience	Respondents
Newspaper advert - Hunter Valley News	Wednesday 25 May 2022 Wednesday 1 June 2022	Weekly paper published on a Wednesday. Average print issue readership of 14,462.	N/A
Community survey	Thursday 26 May-29 June 2022	Promoted through door knocking, letterbox drop and newspaper advert.	3
1800 number	Saturday 4 June 2022-current	Listed on letterbox drop, newspaper adverts and proposal website.	2[14]
Interviews	May-June 2022	10 stakeholders approached.	2

3.3 Comparable projects

6 BESS projects have been identified as comparable projects. Comparable projects have been used to inform additional scoping of social impacts. Key considerations for considering comparable projects include:

- identifying similar project type (battery storage) in order to understand similar potential impacts and benefits
- identifying whether they are seeking/have sought approval via the NSW SSD approval system
- identifying the prevalence of an assessment for social and economic issues
- identifying whether their EIS/SIA authoring date has occurred within the last two years.

The 6 comparable projects at the time of authoring this SIA and EIA, are listed in the table below.

Table 3.3 Comparable projects

Project	Status	Proximity and direction from the proposal	Project description
Eraring Battery Energy Storage System	Approved	Approximately 13 km south of the site, within the Lake Macquarie LGA	700 MW battery storage system with estimated construction workforce of 125 people
Liddell Battery Storage System	Approved	Approximately 111 km northwest of the site, within the Muswellbrook Shire and Singleton Shire LGAs	500 MW batter storage system with estimated construction workforce of 250 people
Great Western Battery Storage System	Seeking approval	Approximately 250 km southwest of the site, within the Lithgow City LGA	500 MW battery storage system with estimated construction workforce of 250 people
Broken Hill Battery Energy Storage System	Approved	Approximately 1,140 km from the site, within the Broken Hill City Council LGA	50 MW battery storage system with estimated construction workforce of 50 people
Hume Battery Energy Storage System	Approved	Approximately 687 km from the site, within the Albury City LGA	20-40MW battery storage system with estimated construction of 40 people
Wallerawang Battery Energy Storage System	Assessment	Approximately 150 km southwest of the site, within the Lithgow LGA	500 MW batter storage system with estimated construction workforce of 100 people

[14] *At 27/06/2022*

Source: Similar projects identified through the NSW Planning Portal and project specific information gathered from project specific Environmental Impact Statement and/or Social Impact Assessment.

Across the 6 BESS projects, the social impacts and benefits assessed were consistent and were clearly linked to specific project stages. Key impacts and benefits are summarised in the table below.

Table Summary of assessed social impacts and benefits from comparable projects

Identified impact	Social/economic	Nature	Scale
Construction			
Direct employment	Economic	Positive	Local-regional
Indirect employment / local expenditure	Economic	Positive	Local-regional
Demand for temporary worker accommodation	Social	Negative	Local
Construction traffic	Social	Negative	Local
Amenity (noise, vibration, light, air quality)	Social	Negative	Local
Operation			
Amenity (noise, visual)	Social	Negative	Local
Support potential increased uptake of renewable energy sources	Economic	Positive	Local-regional
Reduced energy costs for consumers	Economic	Positive	Local-regional

3.4 Scoped social impacts

The scoping tool contained in the DPE Guideline (2020) was a method implemented during the SIA scoping phase, presented in the Social Impact Scoping Report (Premise, 2021). As is the nature of social impact assessment, the scoped impacts have been further refined during the environmental assessment phase in response to design development and engagement outcomes, and to align with the DPE Guideline (2021).

A high-level summary identifying the social impacts that have been carried forward for detailed assessment is provided in the table below, with consideration given to the:

- predicted impact and/or benefit (proposal activity)
- expected social impact and/or benefit
- impacted parties
- the social impact category
- the nature of the social impact and/or benefit
- the source (how the potential social impact and/or benefit has been identified).

Table 3.5 Identified social impacts and benefits

Impact theme	Impact to people (unmitigated)	Impacted parties	Social impact category	Nature	Source
Construction					
Traffic	Temporary changes to how road users move around the local area due to construction traffic	Road users	Way of life, Accessibility	Negative	Scoping report, engagement outcomes

Impact theme	Impact to people (unmitigated)	Impacted parties	Social impact category	Nature	Source
Noise	Temporary decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to noise annoyance during construction	Local residents	Health and wellbeing, Way of life	Negative	Scoping report, engagement outcomes
Air quality	Temporary and localised potential decline in air quality due to construction dust	Local residents	Health and wellbeing	Negative	Scoping report, engagement outcomes
Workforce need	Additional access to employment opportunities in the local area	Local area, regional area	Livelihoods	Positive	Scoping report, engagement outcomes
Operation					
Network resilience	Reduction if the likelihood for a blackout in the area, overall reducing health and wellbeing risks associated with moderate blackout events	Local residents, local area	Health and wellbeing	Positive	Engagement outcomes
Operational noise impacts	Decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to operational noise annoyance	Local residents	Surrounding	Negative	Scoping report
Visual impact and landscape change	Permanent changes to the aesthetic value of the area	Local residents	Surrounding	Negative	Scoping report, engagement outcomes

Following further refinement of the scoped social impacts, the following issues were identified as having a minimal social impact and have not been included as part of this detailed assessment (refer Appendix C for additional information):

- increased demand for temporary accommodation (informed by proposal context, relatively low construction workforce needs and the proposal's proximity to the large regional centres of Newcastle and Cessnock which could accommodate any accommodation needs)
- impacts on Aboriginal heritage and values (informed by the Aboriginal Cultural Heritage and Historic Heritage Assessment, 2022)
- operational employment opportunities (the provision of two-to-three full times jobs has been assessed as an impact with minor scale)
- operational traffic (considering the site will be operated remotely with no need for daily visitation and the workforce demand of one-to-two employees[15], this impact has been assessed as minimal).

It is important to note that while the proposal has a range of positive and indirect impacts, these benefits are occurring at a very large scale as part of local and regional network benefits. Consequently, the Applicant has

[15] *Premise Australia, Scoping report, 2021*

limited ability to provide direct benefits to residents and community members in the local area. Network benefits that have not been included in this SIA due to their low social impact include:

- increased firmness of renewable energy projects
- improved reliability of the of the electricity network.

3.5 Social baseline

A key component in the development of the social baseline was the collation and interpretation of relevant demographic data. Relevant indicators for understanding the local area and surrounding communities are listed in the table below. The table below also highlights how each social baseline indicator relates to one or more social impact categories. For the purpose of transparency, the sources for each social baseline indicator are also included.

Table Baseline indicators

Indicator	Social impact category	Source
Social baseline		
Population	Way of life, Community	ABS, 2016; Remplan, 2020, engagement outcomes
Average household size	Way of life, Community	ABS, 2016
Median age	Community	ABS, 2016
Age profile	Community	ABS, 2016
First Nation Australians	Culture, Community	ABS, 2016
English proficiency	Culture, Way of life	ABS, 2016
Social and economic advantage and disadvantage	Community, Livelihoods, Health and wellbeing	ABS, 2016, engagement outcomes
Household income	Livelihoods	ABS, 2016
Community values	Community, Way of life, Surroundings, Employment, Livelihoods	Engagement outcomes
Unemployment rate	Livelihoods, Way of life	Australian Government, 2022
Regional employment profile	Livelihoods, Way of life	ABS, 2016
Construction opportunities in the Region	Livelihoods, Way of life	ABS, 2016
Electricity generation cost	Way of life, Surroundings	CSIRO, 2021
Renewable sector in NSW	Way of life, Surroundings	Energy NSW, 2020; RBA, 2022
Unemployment rate	Livelihoods, Way of life	Australian Government, 2022

This SIA has not used 2020 Census data and sought clarification from DPE regarding this decision, as justified in Appendix A.

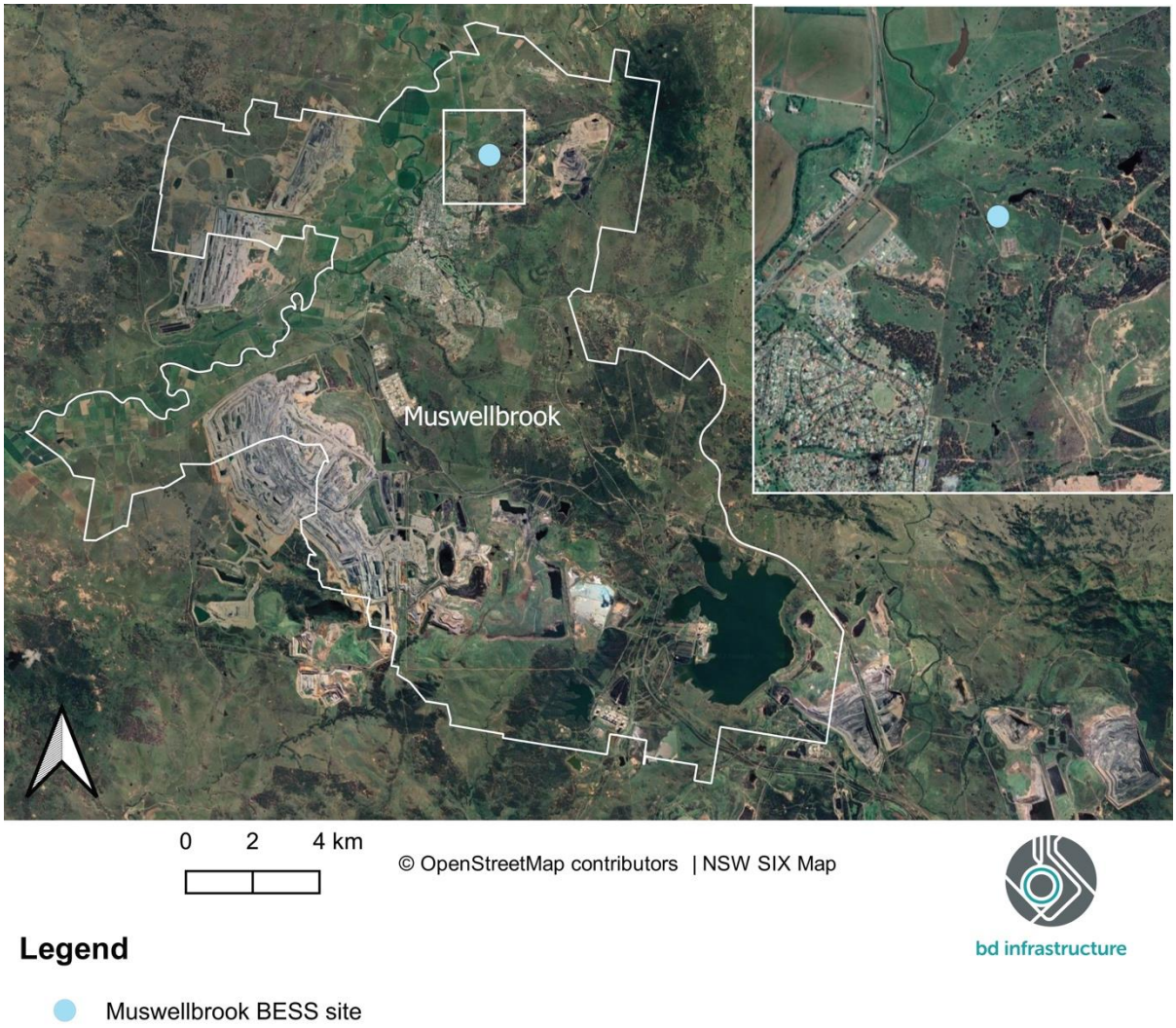
4 Social Baseline

The social baseline for this SIA has been developed to understand the social context of the local area and who and/or how residents, community members and stakeholders might be impacted by the proposal.

4.1 Social locality

The proposal is located in the north-east of the Muswellbrook suburb in the Muswellbrook Shire LGA. Figure 4-1 below shows the proposal is north-east of the town of Muswellbrook and west of the Muswellbrook Coal Mine. The social locality is diverse with residential areas clustered near the Muswellbrook township and open-cut coal mines to the north, west and south of the suburb. The social locality will refer to the suburb of Muswellbrook for this SIA.

Figure 4-1 The proposal site location



Source: Developed by bd infrastructure, suburb boundaries sourced from the ABS

4.1.1 Community profile

Population

The Muswellbrook suburb has a resident population 12,075, representing 75.1 per cent of the Muswellbrook LGA resident population. The majority of the population is located in Muswellbrook township south of the site. Stakeholder interviews identified Muswellbrook as a Regional hub, providing health and government services to the surrounding areas, including the Upper Hunter, reflecting Muswellbrook township as both a residential and services centre.

Between 2016 and 2020, the Muswellbrook LGA experienced a 0.16 per cent decrease in the estimated resident population, while NSW has grown 1.38 per cent over the same period[16]. This suggests the Muswellbrook Shire LGA is experiencing:

- limited population growth
- a slight decline in resident population growth.

2020 data is not available at the suburb level.

Table 4-1 Population

	Muswellbrook suburb	Muswellbrook LGA
Resident population	12,075	16,086

Source: ABS QuickStats, Usual resident population, Muswellbrook (SSC), Muswellbrook (LGA), 2016

Average household size

Within the social locality, the average household size is 2.5 people, the same as the Muswellbrook LGA and slightly lower than the NSW average of 2.6.

Table 4-2 Average household size

	Muswellbrook suburb	Muswellbrook LGA	NSW
Average household size	2.5 people	2.5 people	2.6 people

Source: ABS, QuickStats, Average household size, Muswellbrook (SSC), Muswellbrook (LGA), NSW, 2016

Median age

The median age for the social locality is 34, one year younger than the LGA (35) and four years younger than the NSW median (38). This suggests that the Muswellbrook suburb has a slightly younger age profile than the broader LGA. When compared to NSW, the social locality has a notably younger population.

Table 4-3 Median age

	Muswellbrook suburb	Muswellbrook LGA	NSW
Median age	34	35	38

Source: ABS, QuickStats, Median age, Muswellbrook (SSC), Muswellbrook (LGA), NSW, 2016

Age profile

When compared to the Muswellbrook LGA, the social locality has a relatively similar age profile reflecting the population clustering in and around the Muswellbrook township, as noted above in Figure 4-2. The social locality does have a slightly younger age profile than the Muswellbrook LGA, reflected by:

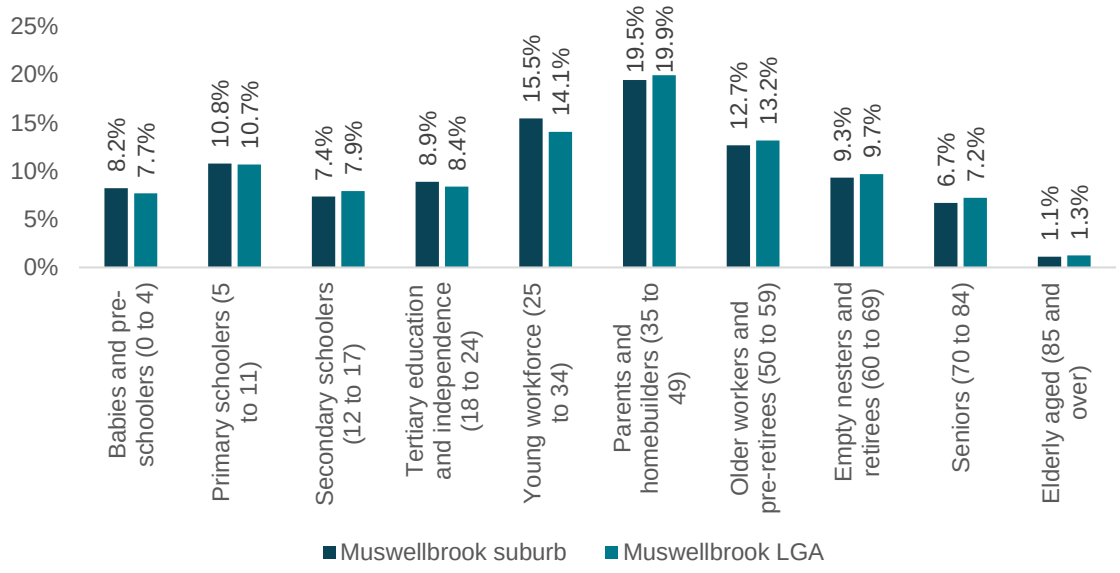
- the higher representation of babies and pre-schoolers (0-4)

[16] *REMPLAN, Community: Muswellbrook*

- the higher representation of younger adults aged 18-34
- the higher representation of residents aged 35-84.

While the age profile differences between the social locality and the Muswellbrook LGA may seem small, considering the social locality represents approximately 75 per cent of the LGA, any difference in age profiles between the social locality and the Muswellbrook LGA is notable and important.

Figure 4-2 Age profile



Source: ABS, TableBuilder Pro, Age, Usual resident population, Muswellbrook (SSC), Muswellbrook (LGA), 2016, Service Age Groups inspired by profile id.

Aboriginal and Torres Strait Islander residents

The proposal is located in the Wonnarua tribal area of the Upper Hunter Valley[17].

A total of 9.3 per cent of the resident population within the social locality is Aboriginal and/or Torres Strait Islander. When compared to the NSW rate of 2.8 per cent, the social locality has three times the rate of First Nation Australians.

Table 4-4 Aboriginal and Torres Strait Islander residents

	Muswellbrook suburb		NSW	
	No.	Per cent	No.	Per cent
Aboriginal and/or Torres Strait Islander residents	1,118	9.3	216,176	2.8

Source: ABS, TableBuilder Pro, Indigenous Status, Muswellbrook (SSC), NSW, 2016

English proficiency

Within the social locality the majority of residents only speak English (87.6 per cent). A total of 4.1 per cent are bilingual while less than one per cent (0.2 per cent) do not speak English. Collectively this suggests that the social locality has both low language diversity and high spoken English proficiency rates.

[17] Ozark, Aboriginal Cultural Heritage & Historic Heritage Assessment Report; Muswellbrook Battery energy Storage System, 2022

Table 4-5 Language diversity

	Muswellbrook suburb	
	No.	Per cent
Speaks English only	10,570	87.6
Speaks another language and English	514	4.1
Not stated	972	8.1

Source: ABS, TableBuilder Pro, Proficiency in Spoken English/Language, Muswellbrook (SSC), Muswellbrook (LGA), 2016

Table 4-6 English proficiency

Speaks another language and English	Muswellbrook suburb	
	No.	Per cent
Very well	314	2.6
Well	161	1.3
Not well	39	0.3
Not at all	19	0.2

Source: ABS, TableBuilder Pro, Proficiency in Spoken English/Language, Muswellbrook (SSC), Muswellbrook (LGA), 2016

Social and economic advantage and disadvantage (IRSAD)

Socio-economic Index for Areas (SEIFA) measures the relative advantage and/or disadvantage of an area compared to the rest of Australia. The index is a comparative tool. In this SIA, the SEIFA metric used is the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD). IRSAD considers factors that indicate both advantage and disadvantage in the same score.

IRSAD has been represented in deciles in this SIA. Each decile represents a proportion of an area within Australia. IRSAD deciles range from 1-10, where decile 1 reflects high levels of disadvantage and low levels of advantage and 10 reflects low levels of disadvantage and high levels of advantage. For example, a suburb with an IRSAD decile of 10:

- has very high levels of advantage
- has very low levels of disadvantage
- is in the top 10 per cent of suburbs in Australia based on their high levels of advantage and low levels of disadvantage.

Muswellbrook suburb has a low IRSAD score (decile 2). This score indicates that Muswellbrook has high levels of disadvantage and low levels of advantage, making it one of the most disadvantaged suburbs in Australia (10-20 per cent of the country).

The IRSAD scores suggest the social locality has a relatively large representation of vulnerable people, households and/or communities. Discussions with Muswellbrook Shire Council noted that Muswellbrook has a large social housing community, with a total of 562 social housing dwellings[18] representing 4.6 per cent of housing stock in the suburb.

It is widely understood that vulnerable groups are more likely to experience negative impacts with greater intensity and, in many cases, have lower resilience to adapt to negative changes.

[18] *REMPLAN, Community: Muswellbrook – Landlord, 2016*

Table 4-7 IRSAD scores for the social locality

	Muswellbrook suburb
IRSAD score	Decile 2

Source: ABS, TableBuilder Pro, SEIFA Deciles, Muswellbrook (SSC), 2016

Household income

Equivalised Total Household Income is an adjusted ABS metric which takes into consideration the household type and size, weighting household income by the number of residents. For the purpose of this SIA, Equivalised Total Household Income is used to consider the income available to the average household and considers the economic resources available to a person.

When compared to NSW, the social locality has the following comparable household income trends:

- a higher representation of residents living on $150-$399 per week
- fewer residents living on more than $1,499 per week.
- representatively fewer residents have access to a weekly income of more than $1,499
- a notable proportion of residents living on $2,000-$2,499 per week.

Equivalised Total Household income indicates that across the social locality, equivalised household income varies, with some households experiencing limited access to economic resources while other households have substitutionally greater access to economic resources. Differences in access to economic resources between households could reflect:

- a wide range of employment opportunities and income brackets
- varying household size
- workforce dynamics within a household.

Discussions with Muswellbrook Shire Council also confirmed that there is notable economic disparity within the local area due to the high earning potential of residents engaged in mining. This is further explored in Section 4.1.2.

Figure 4-3 Equivalised Total Household Income (weekly)

Source: ABS, TableBuilder Pro, Equivalised Total Household Income (weekly), Muswellbrook (SSC), NSW, 2016

Regional economic considerations

The EIA, included in Chapter 7 onwards, includes data and information which is relevant for the SIA. A summary of relevant key findings for the SIA is included below:

- mining is the largest export for the Hunter Valley Region
- the Hunter Valley Region has limited economic diversity, with mining the predominant industry
- there is limited economic opportunity for residents not engaged in the mining sector across the Hunter Valley Region
- salary disparity between top industries of employment (specifically mining) highlights potential economic vulnerability within the Hunter Valley Region
- renewable energy sources such as wind and solar have notably lower generation costs with opportunity for generation costs to decrease over the next 30 years. In comparison, the generation cost of electricity from black coal and gas is unlikely to decrease over the next 30 years and may increase in response to State and Federal environmental policies
- the renewable energy sector currently generates significant project and infrastructure investment in NSW. Delivering supporting infrastructure (such a BESS) will indirectly increase the feasibility of new renewable projects in the region, generating new investment and employment opportunities.

4.1.2 Community values and local issues

An understanding of community values and local issues was collated through stakeholder and community engagement activities and primarily focus on:

- local landscape
- visual amenity
- air quality
- a just transition
- housing supply
- community cohesion

Local landscape

While Muswellbrook has multiple open-cut mines in the local area, there is reported community concern relating to the impact of new projects on local landscapes and vistas. Engagement activities highlighted that the presence of coal mining is accepted in the community with many residents acknowledging the employment and economic importance of the industry for the Region. However, residents are generally concerned about further/more projects which impact the rural nature and local landscape. This includes new renewable energy projects such as wind farms.

It was also commented that Sandy Creek and the surrounding area close to the proposal site is highly valued for its rural character and landscapes.

During door knocking activities, residents in close proximity to the proposal were aware of the adjacent residential development and the Muswellbrook Bypass. One resident commented that the proposal seemed rather minimal compared to the Muswellbrook Bypass.

Visual amenity

Related to the topic of ‘landscape change’, it was commented that the proposal should strive to reduce visual impacts using vegetation and plantings. The Scone Ausgrid Substation was identified by a stakeholder as a good example that should be considered as a reference for mitigation measures for the proposal. It was also commented that community members appreciate the effort for visual impacts to be mitigated, reflecting the community’s values for the local landscape and rural nature.

Air quality

It was commented during stakeholder interviews that coal dust is an issue that is highly discussed within the community. Opinions on coal dust within the Muswellbrook community tend to focus on either:

- the negative health impacts and concerns
- the importance of coal mining to the local economy (accepted impact of coal mining).

Local air quality is further impacted during cooler months due to the use of wood fire heaters. Recently, Muswellbrook Shire Council has been actively working to improve air quality impacts associated with wood fire burners, offering all residents a $50 rebate for chimney flue cleaning[19].

A just transition

The cost of electricity was discussed in stakeholder interviews, with interviewees noting that the severity of an impact at the household level is highly linked to economic advantage/disadvantage. A representative of Council commented that lower socioeconomic households experience the impacts of electricity price rises more than other households due to:

- lower household incomes, meaning price increases are proportionally more expensive
- limited ability to invest in renewable technologies (such as solar panels) to assist in reducing household electricity prices long term.

It was also noted that many households in the LGA had invested in rooftop solar already, however, these were most likely more affluent households.

Consequently, any ability to curve peak demand pricing would benefit lower socioeconomic households who have less agency, or ability[20], to invest in small scale renewables.

Housing supply

It was noted that the current housing market in Muswellbrook is inflated, both for purchasing and renting. Identified drivers of increased demand included:

- limited supply
- limited new land releases/future supply
- increased demand, partially associated with tree-change migration driver by COVID-19
- increased demand associated with shift, Fly-In-Fly-Out (FIFO) and Drive-In-Drive-Out (DIDO) workers.

Collectively, a mixture of high demand and low supply, desirable lifestyle and temporary accommodation needs has placed substantial pressure on the local housing market.

Increased housing costs and decreased availability are commonly recognised impacts of FIFO and DIDO workers on local communities, also called 'host communities'[21].

Community cohesion

Community dynamic and social cohesion was identified as an important topic in Muswellbrook by stakeholders. It was commented that while DIDO workers stimulate the local economy during their stays, they do not contribute to place making and/or community development. One stakeholder commented that DIDO workers do not invest time in the community, such as joining community groups, social activities, or play in local sporting teams. It is widely acknowledged within social impact research that the limited participation and integration of DIDO workers does have the potential to reduce the viability of volunteer groups and community clubs in host communities[22].

Stakeholders were highly supportive of a local procurement processes/local buying arrangements for the following key reasons:

- it reduces reliance on DIDO workers
- does not further contribute to temporary and rental housing affordability and supply issues
- provide investment in the local workforce and businesses, capturing economic benefits locally.

It was acknowledged that some technical and specific needs may need to be met from outside the local area.

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[19] *Muswellbrook Shire Council, rebate for chimney flue cleaning now available, 27 April 2022*

[20] *This could include tenure arrangements, such as renting and social housing, which prevents or limits permanent changes to dwellings*

[21] *Australian Centre of Excellence for Local Government, Scoping study: Impact of fly-in fly-out/drive-in drive-out work practices on Local Government, 2012*

[22] *Australian Centre of Excellence for Local Government, Scoping study: Impact of fly-in fly-out/drive-in drive-out work practices on Local Government, 2012*

5 Social Impact Assessment

5.1 Assessment approach

Fundamental to the assessment approach are three core metrics:

- **nature**: impacts/benefits can be negative (impact) or positive (benefit), with varying significance
- **experience**: impacts/benefits can be perceived (intangible or perceptions) or actual (tangible), both carry equal importance
- **significance**: building on an impact/benefit's nature, the Department of Planning and Environment's Social Impact Significance Matrix assesses the expected significance of predicted impacts/benefits.

These three core metrics were used to assess the identified social and economic impacts and benefits, as well as to develop appropriate mitigation and enhancement measures.

DPE's Social Impact Significance Matrix (the Matrix) has been used to assess each social and economic impact and benefit. The Matrix ranks each impact and benefit between low and very high. Low impacts/benefits are expected to have a low probability of occurring either/and/or minimal impact/benefit, and very high impacts/benefits are expected to have a high probability of occurring either/and/or significant

Table 5-1 Social Impact Assessment Matrix

	Magnitude level				
	1	2	3	4	5
Likelihood	Minimal	Minor	Moderate	Major	Transformative
A Almost certain	Low	Medium	High	Very high	Very high
B Likely	Low	Medium	High	High	Very high
C Possible	Low	Medium	Medium	High	High
D Unlikely	Low	Low	Medium	Medium	High
E Very unlikely	Low	Low	Low	Medium	Medium

Source: Adapted from the NSW Department of Planning and Environment's Technical Supplement: Social Impact Assessment Guideline for State Significance Projects (2021)

Key terms used to inform the assessment within the Matrix, specifically the magnitude level, include:

- **extent**: who will be impacted by identified impact/benefit, focusing on number of people, locations, and social/community groups
- **duration**: the expected timing of impact/benefit and length of exposure
- **intensity or scale**: the likely scale or degree of change caused by impact/benefit
- **sensitivity or importance**: the sensitivity of receivers and/or the level of importance of the impact/benefit
- **level of concern/interest**: level of community interest/concern of identified impact/benefit.

This section has been informed by the research methodology outlined in Chapter 3 including engagement with the local community, research and analysis of the area surrounding the proposal, technical assessments, and review of comparative projects.

The following sections provide further detail on each of the scoped social impacts by the themes identified in Table 3.

5.2 Construction stage impacts

5.2.1 Traffic

Increased traffic associated with the construction phase may impact the social locality in terms of accessibility and how people live and get around. During engagement, concern around increased traffic was not noted by local residents or community groups, but was raised by a small number of residents via the broader community surveys. Muswellbrook Shire Council also noted the need for access routes to accommodate oversize deliveries.

A Traffic Impact Assessment was undertaken for the proposal by Amber (July 2022) and identified that during peak construction (a duration of approximately five months), the proposal is expected to generate up to 60 light vehicle, 6 shuttle bus, and 60 heavy vehicle movements per day during peak construction times, reducing to 30 light vehicle, 2 shuttle bus, and 24 heavy vehicle movements per day in the average construction period. The Traffic Impact Assessment considered that the road network would be able to readily accommodate the traffic generated by the development during the construction and operational periods, with minimal changes to existing conditions.

In terms of cumulative impacts, the Traffic Impact Assessment noted that the combined increase in traffic generated by the proposal and other major projects within the vicinity of the proposal is expected to have minimal cumulative impact on the road network in the surrounding areas.

A site-specific Construction Traffic Management Plan would be prepared for the proposal to appropriately manage the use of the designated construction routes and construction traffic access to the site. Clear signage and communication materials would also be required to ensure road users and the local community are sufficiently educated in terms of the changes associated with the additional traffic movements. It would also ensure that road users to get to their destinations as efficiently as possible.

On the basis of the adoption of recommended mitigation strategies in the Traffic Impact Assessment and adequate communication with road users and local residents, the proposal would have a low residual negative social impact for road users and local residents.

Table 5-2 Assessment of traffic impacts during construction

Social impact: Temporary changes to how road users move around the local area due to construction traffic					
Category: Access, Way of Life					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Road users Local residents	Negative	Minor (2)	Possible (C)	12 months	**Medium (C2)**
Mitigation:	• Implement recommendations as per the Traffic Impact Assessment (2022) • Clear communication methods that are complementary to more traditional measures such as signage (including variable message signs), that typically help road users to get to their destinations efficiently.				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
Road users Local residents	Negative	Minimal (1)	Possible (C)	12 months	**Low (C1)**

5.2.2 Noise impacts

Construction noise has the potential to cause a temporary decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to noise annoyance or disturbance. While construction noise and was not raised as a concern by community during the engagement, it is a key consideration when looking at potential social impacts during construction.

The proposal is located adjacent to an existing substation compound in a rural area with a suburban interface to the east of the New England Highway. There are seven sensitive receivers, identified in the Noise Impact

Assessment prepared by Assured Environmental (2022) within 400 metres of the proposal, with a total of 26 sensitive receivers within 500 metres and the nearest being 370 metres to the southwest.

It is noted that there is a residential development proposed to the west (associated with Northview Estate) and the Noise Impact Assessment has taken possible receivers into consideration. This has resulted in 3 nearby receivers potentially being within 145 metres to 210 metres of the proposal. The Muswellbrook Bypass is also currently proposed directly adjacent to the eastern boundary of the proposal site.

It is anticipated that during construction, a range of activities will generate noise impacts with varying severity. The Noise Impact Assessment notes that the highest predicted noise level activities are the shortest lived, meaning they have relatively high severity with low duration. The highest predicted noise level for the closest existing receiver is anticipated to be experienced at 60 dB(A).

As previously noted, the Noise Impact Assessment also considered the future residential development associated the Northview Estate. The closest point between the Northview Estate lot boundary and the proposal was used to generate a worst-case scenario. The highest predicted noise level at the closest potential future receiver is anticipated to be experienced at 69 dB(A).

Noise would not exceed the highly affected noise criteria of 75 dB(A) set out in the Interim Construction Noise Guidelines (ICNG) at any residence.

The Noise Impact Assessment notes a range of management and mitigation measures to reduce noise impacts, including:

- restriction of construction works to recommended hours as per the ICNG (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no works on Sundays or Public Holidays)
- management of construction noise, including limiting concurrent activities undertaken close to sensitive receivers; considering using plant and equipment which produces less noise; operating plant and equipment in a quiet and efficient manner; reducing throttle settings; turning off equipment when not in use; and, regularly inspecting plant and equipment to ensure it is in good working order.

A complaints handling protocol should also be established for the proposal prior to construction commencing to facilitate community feedback and to ensure that potential complainants are provided with information relating to how their concern has been assessed, considered, and where reasonable and feasible, addressed.

Shift workers

Considering the high representation of residents engaged in mining in the social locality[23] with approximately 1 in 3 employed residents work in coal mining, it is highly possible that residents near the proposal may be shift workers. This consideration was also confirmed during door knocking activities undertaken as part of this SIA. While the recommended hours reduce noise impacts on residents who work outside of the house/offsite 9am to 5pm, or similar hours, the recommended hours will likely impact shift workers.

Shift workers often rest during the day when on night shift, meaning construction activities may interrupt residents' sleep, causing sleep disruption. Sleep disruption can have impacts on an individual's health and wellbeing. Sleep disruption in healthy adults has been associated with:

- stress responsivity (one's capacity to manage stress)
- somatic pain (such as headaches)
- reduced quality of life
- emotional distress
- mood disorders (such as depression)
- cognitive, memory, and performance deficits[24].

Sleep disruption is likely to have greater negative impact on adults with pre-existing conditions. Without mitigation, health and wellbeing impacts associated with sleep disruption have been assessed as high (unmitigated).

[23] *36.5 per cent of employed residents work in coal mining in SA1 1112602, ABS, 2016*

[24] *Alhola, P., & Polo-Kantola, P., Sleep deprivation: Impact on cognitive performance, Neuropsychiatric Disease and Treatment, 2007*

In order to reduce potential sleep disruption impacts on shift workers, the proposal should seek to:

- provide clear and transparent information about noise impacts to assist shift workers in managing their needs, particularly during any work generating high noise levels that have impulsive, intermittent, low frequency or tonal characteristics
- adopt onsite noise reduction recommendations proposed in the Noise Impact Assessment (2022)
- adopt noise management measures developed in consultation with potentially impacted sensitive receivers, including shift workers identified through engagement activities.

Upon implementation of the proposed recommendations, it is anticipated that the proposal would have a low residual negative social impact for local residents, including shift workers.

In terms of cumulative noise impacts, the Noise Impact Assessment notes that Transport for New South Wales is expecting to commence construction of the New England Muswellbrook Bypass area at a similar time to the commencement of construction for the BESS. As the New England Muswellbrook Bypass is a prolonged project which will take place in stages, there could be potential for peak construction of both projects to overlap. If this occurs, the Applicant will consult with Transport for New South Wales to manage any potential impacts and implement additional noise mitigation measures in accordance with the ICNG if required. This assessment acknowledges that ongoing and timely consultation with Transport for New South Wales would support the need to both understand and manage the potential cumulative noise impacts.

Table 5-3 Assessment of noise impacts during construction

Social impact: Temporary decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to noise annoyance during construction					
Category: Way of life, Health and wellbeing					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Local residents	Negative	Minor (2)	Likely (B)	12 months	**Medium (B2)**
Shift workers	Negative	Moderate (3)	Likely (B)	12 months	**High (B3)**
Mitigation:	• implement recommendations identified in the Noise Impact Assessment (2022) • noise management measures developed in consultation with potentially impacted sensitive receivers, including shift workers • provide clear and transparent information about noise impacts to potentially impacted sensitive receivers, including shift workers • establish a complaints handling protocol.				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
Local residents	Negative	Minimal (1)	unlikely (D)	12 months	**Low (D1)**
Shift workers	Negative	Minimal (1)	Possible (C)	12 months	**Low (C1)**

5.2.3 Air quality

Air quality was raised by stakeholders as an important local issue. Representatives from the Sustainability Hub and Muswellbrook Shire Council both commented that coal dust and fine particulate matter emitted by wood fire heaters contributed to air quality concerns in the local area and broader region.

Air quality impacts associated with construction works, primarily caused from earthworks, are expected to be limited both in severity and duration. Dust mitigation included as part of standard construction management will assist in reducing dust generated by construction activities. Considering air quality is already a local issue, air quality impacts associated with the proposal are expected to have a medium social impact (unmitigated).

It is recommended that the following mitigation measures be adopted:

- implement standard air quality management measures

- establish a complaints handling protocol prior to construction commencing.

Upon implementation of mitigation measures, social impacts associated with reduced air quality and/or perceptions of reduced air quality have been assessed as low (mitigated).

This assessment also recognises that should the construction period for the proposal overlap with the Muswellbrook Bypass or other nearby proposed developments, it is possible that the proposal will contribute to cumulative air quality impacts on the local area. It is recommended that the proponent fosters a proactive relationship with the appropriate members of Transport for NSW and other relevant developers to ensure any potential future cumulative impacts are understood and are mitigated in a collaborative way.

Table 5-4 Assessment of air quality impacts during construction

Social Impact: Temporary and localised potential decline in air quality due to construction dust					
Category: Way of life, Health and wellbeing					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Local residents	Negative	Minor (2)	Almost certain (A)	12 months	**Medium (A2)**
Mitigation	• implement industry standard air quality management • establish a complaints handling protocol prior to construction,				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
Local residents	Negative	Minimal (1)	Almost certain (A)	12 months	**Low (A1)**

5.2.4 Workforce need

The proposal is expected to generate a peak construction workforce of approximately 75 people. Construction is a major industry of employment for residents in the Hunter Valley Region, and the proposal will generate new construction jobs in the Region and social locality.

New employment opportunities would likely have positive impacts on:

- regional unemployment rates
- the number/proportion of construction workers who can live and work in the Region
- support a diversified regional economy.

Stakeholder engagement activities noted support for new jobs in the local area and broader area as a result of the proposal. Prior to the implementation of enhancement measures, direct employment is expected to have a low social benefit due to limited likelihood/uncertainty regarding where the construction workforce may be sourced from.

The expected economic benefits can be enhanced through local employment policies. This would increase the likelihood that construction workers live within the Region. A local procurement policy was both recommended and supported by stakeholders during engagement activities.

It is expected that the implementation of a local procurement policy would increase direct employment benefits from a low social benefit to a medium social benefit, as shown below in Table 5-5.

Table 5-5 Assessment of direct impact during construction

Impact: Additional access to employment opportunities in the local area					
Category: Livelihoods					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Regional	Positive	Minor (2)	Unlikely (D)	12 months	**Low (D2)**
Enhancement	Investigate and implement local procurement policy to enhance employment benefits.				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
Regional	Positive	Minor (3)	Possible (B)	12 months	**Medium (B3)**

5.3 Operational stage

5.3.1 Network resilience

Considering the current East Coast energy crisis, discussed in Section 2.5, there is currently heightened public awareness of network reliance and supply issues.

A tangible impact associated with high energy demand and low supply is blackouts. Blackout events can have a range of health and wellbeing impacts on individuals and households, which include:

- inability to cool dwellings. During extreme heat events, people can experience heat exhaustion and heat stress[25]. Those most at risk are vulnerable members of society and include the elderly, pregnant women, lower socio-economic households/communities, children, and people with disability and/or chronic health conditions. During extreme heat events, heat related deaths and heat related admissions to hospital significantly increase[26]. Blackouts are more likely to occur during heat wave events as households rely on air conditioning, causing peak demand to increase[27] , exacerbating the supply issues
- increased likelihood of stress and impacts to mental health. Blackout events can cause stress on individuals. This could include stress or anxiety caused by the loss of perishable foods or the ability to maintain personal hygiene (accessing hot water). For lower socio-economic households, there is likely to be higher levels of stress associated with food wastage[28]
- social isolation. An individual's ability to communicate with family, friends or emergency services is notably reduced during blackout events. For residents who rely on home phones and landlines, blackouts impact their ability to communicate. For residents with mobile phones, their ability to communicate is highly dependent on their available battery life[29].

The proposal could reduce health and wellbeing impacts by increasing the reliability of local electricity supply, resulting in a local electricity network that is more resilient to blackouts when faults do occur. This would be achieved by providing power, frequency and voltage support to the local electricity network during high stress periods (usually associated with peak demand periods).

The ability to reduce the likelihood of blackout events caused by network faults is expected to have medium social benefit. While the magnitude of this benefit is expected to be moderate, with the potential to support the

[25] *NSW Health, How climate can affect health: Hot weather and heat waves, https://www.health.nsw.gov.au/environment/climate/Pages/how-climate-can-affect-health*

[26] Khalaj B., et, al, The health impacts of heat waves in five regions of New South Wales, Australia: a case-only analysis, International Archives of Occupational and Environmental Health, 2010

[27] *A. Malik, et. al, Appliance level data analysis of summer demand reduction potential from residential air conditioner control, Applied Energy, 2019*

[28] *Adelphi Psych Medicine Clinic, Surprising effects of Power Outages on Mental Health, 2017*

[29] *Australian Government, Department of Infrastructure, Transport, Regional Development and Communication, How residents can prepare for telecommunication outages in emergencies or natural disasters, 2022*

daily need of up to 17,250 households during a blackout event[30] [31], there is a level of uncertainty regarding how certain/degree of resilience could be provided.

Table 5-6 Network resilience during operation

Impact: Reduction if the likelihood for a blackout in the area, overall reducing health and wellbeing risks associated with moderate blackout events					
Category: Health and wellbeing					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Local area (approximately 17,250 dwellings)	Positive	Moderate (3)	Almost certain (C)	20 years	**Medium (C3)**
Enhancement	No viable enhancement measures				

5.3.2 Noise impacts

Noise impacts are expected to low during operation and was raised as a concern by some residents during doorknocking activities. It was also identified by Tindale Property, primarily for future land releases for Northview Estate.

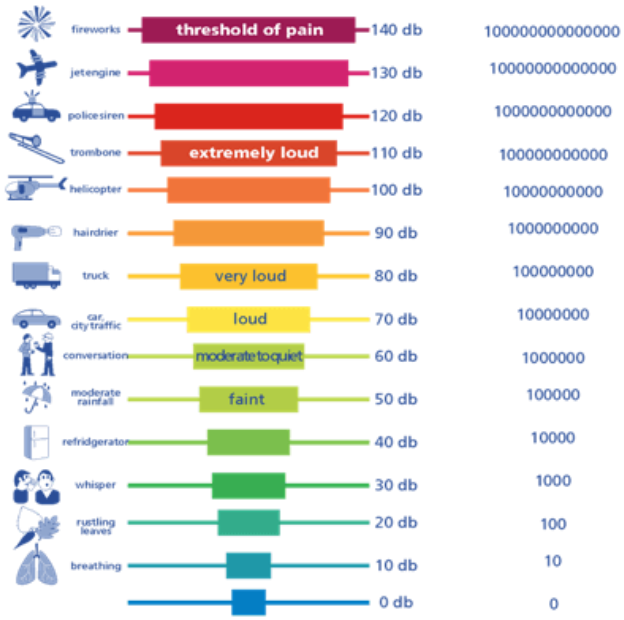
In response to concerns, the Applicant has refined the proposal design to include the installation of noise barriers to the west of the BESS cells at a height of ~3m above ground. The final location of noise barriers would be determined during detailed design to ensure that the noise criteria are met. The Noise Impact Assessment (2022) undertaken to inform the EIS determined that the anticipated operational noise of the proposal, considering both existing and future sensitive receptors, is compliant in accordance with the NSW Noise Policy for Industry upon the inclusion of the 3 metre noise barriers.

The Noise Impact Assessment shows that the highest predicted noise level at existing residences will be 28 dB, which is less than the sound of a whisper. For future residents closest to the site, the highest predicted noise level is anticipated to be 36 dB during operation. Based on the figure below, this would be less than the sound of a refrigerator cycling. Given the outcomes of the Noise Impact Assessment, and the inclusion of the noise barrier around the BESS cell blocks, the residual social impact associated with operational noise is assessed as low.

[30] *Based on estimated residential energy consumption benchmarks developed by Frontier Economics, a 10MW battery has the capacity to meet the daily need of 1,150 households during a blackout event30. When applying this benchmark to the proposal, the 150MW battery storage has the capacity to meet the daily needs of 17,250 households during a blackout event.*

[31] *Frontier Economics, Residential energy consumption benchmarks, 2020*

Figure 5-1 Sound experience



Source: commodious, 2022

In terms of cumulative noise, the Noise Impact Assessment (2022) notes that the cumulative noise level from the operation of the BESS and the Muswellbrook Bypass are not able to be determined due to the lack of information available. It does note that the highest predicted noise level from the proposal is 36 dB(A) during the night-time period. The predicted noise level from the Muswellbrook Bypass is around 55 dB(A). The proposal is therefore approximately 19 dB(A) below the Muswellbrook Bypass. While this assessment considers it unlikely that the operation of the BESS will contribute to a cumulative noise impact during operations, given the unavailability of evidence, a risk assessment rating has not been provided.

Table 5-7 Assessment of operational noise impacts

Social impact: Decline in way of life and associated health and wellbeing for local residents, specifically shift workers, due to operational noise annoyance					
Category: Way of life, Health and wellbeing					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
Local residents Shift Workers	Negative	Minor (2)	Likely (B)	20 years +	**Medium (B2)**
Mitigation:	• implement recommendations identified in the Noise Impact Assessment (2022) • 3m high noise barriers.				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
Local residents Shift workers	Negative	Minimal (1)	Possible (C)	20 years +	**Low (C1)**

5.3.3 Visual impact and landscape change

Stakeholder and community engagement undertaken to inform the SIA notes that cumulative landscape change (including visual impacts) is a community concern. While the Muswellbrook Bypass will be the major driver of landscape change in the local area, this proposal will contribute to cumulative visual impacts and community perceptions and attitudes towards landscape change.

As part of the EIS for the proposal, a Visual Impact Assessment Report was prepared by Iris (2022). The Visual Impact Assessment Report investigates the visual impact the proposal will have on the local area, considering a range of viewpoints including from public and private property. The Visual Impact Assessment Report considered:

- landscape features that limit lines of sight
- vegetation
- current and future land uses
- the proposed Muswellbrook Bypass.

The Visual Impact Assessment Report notes that two of the four public viewpoints will be impacted by the proposal. These included:

- the view east from Sandy Creek Road (minor adverse impact)
- the view east from Queen Street (minor adverse impact).

Viewpoints from private properties which would be impacted included:

- dwellings on the northern side of Lonhro Place in the Northview Estate (minor adverse)
- future residential development southwest of the site (minor adverse).

The Visual Impact Assessment Report notes that the proposed Muswellbrook Bypass will have a notably greater impact on public and private viewpoints than the proposal and provides a background in which the proposal sits in front, interrupting view lines (looking west to east) regardless of the proposal.

The Visual Impact Assessment Report notes that the proposed Muswellbrook Bypass will have a notably greater impact on public and private viewpoints than the proposal and provides a background in which the proposal sits in front, interrupting view lines (looking west to east) regardless of the proposal.

In terms of social impacts to private properties and residential receivers, the Visual Impact Assessment Report notes that the co-location of the proposal adjacent to the existing Ausgrid substation has minimised visual impact relative to a greenfield development.

The proposal also includes mitigation measures such as screening vegetation on the western boundary of the southern area of the development area, to respond to concerns raised by the developer for the potential for this area to be visible from areas to the southwest of the development area. The proposal has also been located as far as possible away from the existing and proposed residences within Northview Estate. The inclusion of screening vegetation will also reduce the visual impact for future residents.

The Visual Impact Assessment Report proposes six recommendations that focus on screening, lighting and use of natural colours. Given the co-location of the proposal adjacent to the existing Ausgrid substation and assuming the proposal implements the mitigation measures and recommendations proposed in the Visual Impact Assessment Report, this SIA considers the residual social impact associated with visual impacts for local residents would be low.

This SIA acknowledges that the proposal has been proactive in reducing visual impacts, however, due to the development context of the area, there will be cumulative visual impacts outside the control and scope of the proponent. This SIA does not request the Applicant take responsibility for these cumulative impacts, but rather acknowledges the precautionary design refinements the proposal has already adopted. It is worth noting however, as described in the Visual Impact Assessment Report, that the precautionary vegetation screening included in the design, would mitigate against potential cumulative visual impacts resulting from the proposed Muswellbrook Bypass at the R5 large lot residential zone due west of the site, which is the intended location of Stage 7 of the Northview Estate development.

Table 5-8 Assessment of visual impacts and landscape change during operation, local residents

Social Impact: Permanent changes to the aesthetic value of the area					
Category: Surroundings					
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Unmitigated:**
local residents (existing and future)	Negative	Moderate (3)	Possible (C)	20 years +	**Medium (C3)**
Mitigation measures	Adopt mitigation measures proposed in the Visual Impact Assessment (2022). Screening vegetation on the western boundary of the southern area of the development area				
Scale:	Nature:	Magnitude:	Likelihood:	Time:	**Mitigated:**
local residents (existing and future)	Negative	Minor (2)	Unlikely (D)	20 years +	**Low (D2)**

5.4 Recommendations

Based on the assessment of social impacts and community and stakeholder engagement outcomes, this SIA recommends the following mitigation measures:

- development and implementation of a local procurement policy which aims to engage the local construction workforce and relevant suppliers
- a commitment to develop a complaints handling protocol prior to construction
- developing the proposal website further to be a central source of information. This should include:
  - a summary of all environmental and social impacts, with the associated committed actions and mitigation measures adopted in the EIS
  - links to all relevant publicly available proposal information
  - clear contact details to support a complaints handling protocol
- implementing the noise management measures developed in consultation with potentially impacted sensitive receivers
- establishing clear lines of communications with project teams responsible for the management and delivery of the Muswellbrook Bypass
- supporting the adoption of all technical mitigation measures identified in other technical assessments.

Each recommendation is explored in greater depth below.

5.4.1 Local procurement policy

Community and stakeholder engagement raised local procurement as an important benefit of the proposal. Key stakeholders also articulated that they would like to see a local procurement policy adopted for this proposal in order to ensure benefits associated with construction activities were captured in the local area and Region.

While some skills and materials may not be able to be sourced locally or regionally, this SIA recommends the proponent investigates and implements an appropriate local procurement policy. The policy should prioritise local employment, services, and materials where financially and logistically possible.

It is recommended that the proponent co-ordinate with the Local Buy Foundation, or similar organisation.

5.4.2 Complaints handling protocol

This SIA recommends that a complaints handling protocol be established for both the construction and operation of the proposal. Core principles of the complaints/inquiry system should include:

- easily accessible and publicly available contact avenues, including mailing address, email, and 1800 phone number
- a commitment to responding to all complaints within an acceptable period
- a commitment to resolving all complaints within an acceptable period
- provide clear pathways for escalation if resolution is not possible.

5.4.3 Robust proposal website

A robust proposal website should be developed and updated throughout construction and operation of the proposal. The proposal website should strive to be a central source of information for residents, stakeholders and the broader community. The website should include:

- a summary of all environmental and social impacts, with the associated committed actions and mitigation measures adopted in the EIS
- links to all relevant publicly available proposal information
- clear contact details to support a complaints handling protocol.

Providing a central source of information for the proposal will likely reduce miscommunication within the community and reassure community members and stakeholders that key issues do have committed mitigation and management measures.

5.4.4 Targeted consultation

Noting that shift workers may be impacted by the proposal, it is recommended that during construction activities additional engagement support is provided to impacted households to better understand their needs. This targeted consultation should provide feedback on construction management while simultaneously developing unique household orientated mitigation measures which improve the liveability and experience of notably impacted households.

5.4.5 Inter-project communication

Interproject communication will likely be important for the proposal. Due to the limited nature of amenity impacts associated with the proposal, compared to the Muswellbrook Bypass, it will be important to be able to openly communicate with the Muswellbrook Bypass delivery team about complaints received to determine who is responsible/degree of responsibility of construction impacts.

6 Social impact assessment conclusion

This SIA has considered the context of the proposal and the likely social impacts that may arise as a result of both construction and operation.

It has found that the proposal would likely result in positive social benefits to the wider community including:

- increased resilience and sustainability of NSW's electricity grid
- provision of opportunities for local employment and income
- reducing the potential for future blackout or load shedding events that may occur as a result of an overburdened, underperforming network
- providing electricity to the NEM during periods of high demand.

During construction, impacts would be localised. Potential negative impacts would be related to health and wellbeing, accessibility, and way of life, and would be temporary in nature and would be managed to an acceptable level through proven management measures.

The Applicant has responded to potential negative operational social impacts through proposal refinement measures including the installation of noise barriers and vegetation screening. These refinements specifically consider:

- the close proximity of current and future residents to the proposal site
- valued rural lifestyle and scenery of the local area.

This assessment also concludes that, given the specific proposal impacts above, any potential cumulative impacts in the local area would be minimal and the Applicant should ensure that interproject communication with the Muswellbrook Bypass delivery team is maintained to minimise any potential cumulative impacts.

The SIA recommends that the following actions be adopted in order to enhance potential benefits and mitigate potential impacts:

- develop and implement a local procurement policy
- develop and implement a meaningful complaints handling protocol
- develop clear and transparent communication channels
- develop noise management measures in consultation with potentially impacted sensitive receivers
- establish inter-project communication channels with the Muswellbrook Bypass delivery team in order to manage cumulative impacts as needed
- adopt all recommendations in other technical reports.

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Economic Impact Assessment

7 Economic assessment methodology

7.1 Approach

This EIA utilises an input-output (IO) methodology and associated software, provided by REMPLAN Economy, with capital investment value and employment demand estimates developed by Coutts Cost Consulting (2022).

IO analysis is a form of macro-economic analysis which considers the economic interaction between industries within an economy. Based on inter-industry interactions, input-output analysis seeks to understand the direct and indirect economic impacts of investment. Through tracking the investment impact of one dollar (or one job) across an economy, IO analysis models how economic investment may be distributed and stimulate other industries within an economy (multipliers).

For this EIA, the following indicators have been used to assess the potential economic benefit of the proposal:

- project expenditure
- employment benefits
- value-added benefits.

Collectively, these indicators will quantify:

- direct and indirect employment benefits (job creation) associated with construction and operation
- direct and indirect value-added during construction and operation.

The EIA assess potential economic impacts at both the Regional (Hunter Valley exc. Newcastle SA4) and State scale (New South Wales).

The direct and indirect employment and value-added impacts are assessed by proposal stage (construction and operation) due to the notably different labour requirements for each stage.

7.2 Assumptions

7.2.1 Terminology

In this EIA, the following terms are used to describe economic impact:

- **direct**: refers to direct investment (employment or capital), on the industry of investment, as a result of the proposal
- **indirect**: refers to economic impacts associated with expansion of Regional or State economies, such as flow on supply-chain effects and impacts associated with increased wages and spending (consumption effect)
- **supply-chain effect:** refers to the impact of purchasing of local goods and services as a result of proposal activities
- **consumption effect**: refers to the economic impact of wages and salaries being spent on consumption, reflecting workforce expenditure captured in the Regional and State economies
- **total impact**: refers to the economic impact of direct and indirect economic impacts.

7.2.2 Limitations and clarifications

The EIA has been undertaken considering the following limitations and clarifications:

- this EIA utilises both employment generation and capital investment as inputs for the IO analysis

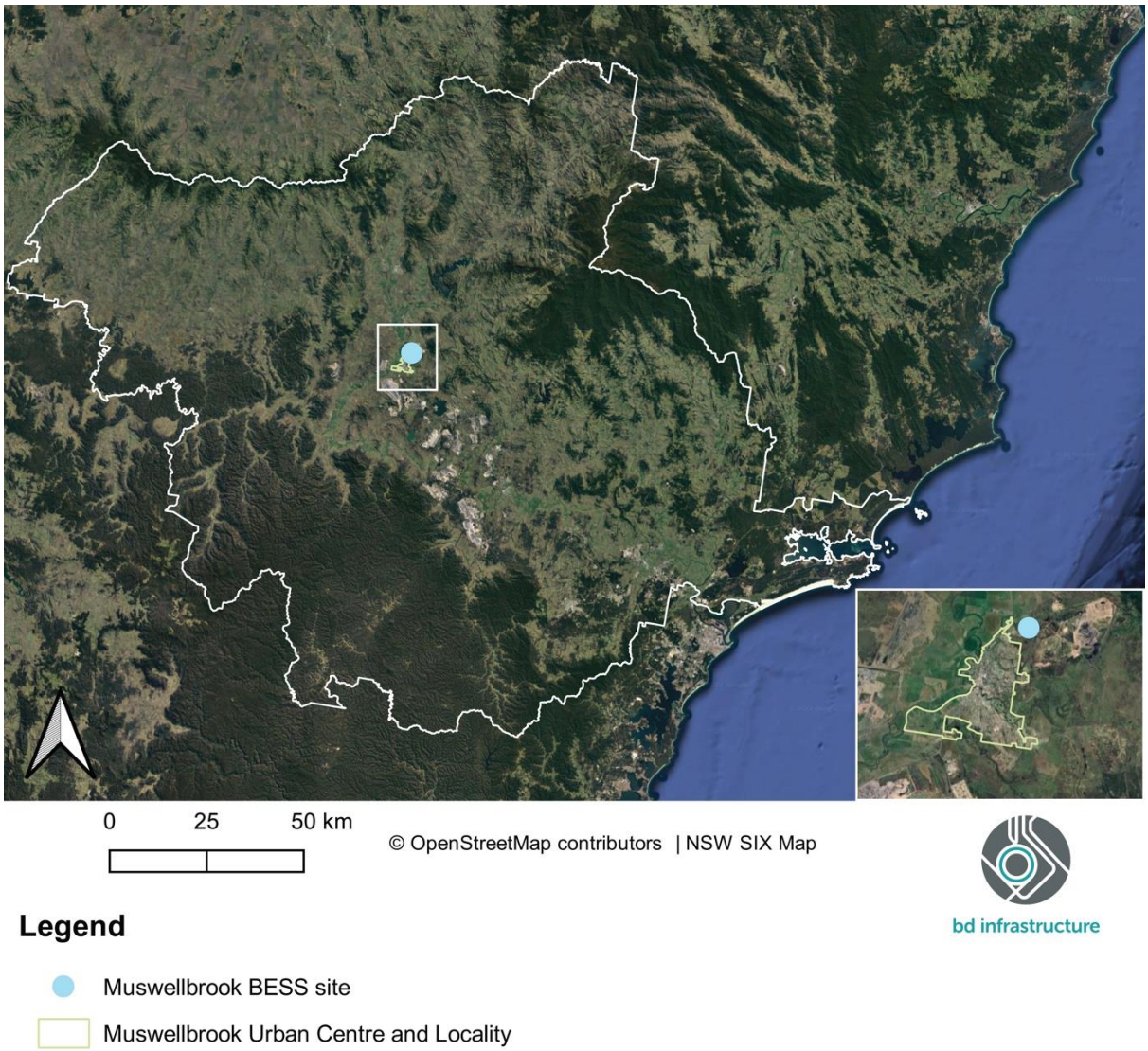
- when assessing economic impacts associated with the construction stage of the proposal, indirect and total economic benefits have been generated based on inputs to the *Construction Industry: Construction Services*
- while the SIA recommends a local procurement policy, there is a level of uncertainty surrounding the number of jobs (FTE) which will be filled by workers in the Region during construction. Consequently, the EIA has considered the following three scenarios:
  - 50 per cent of the construction workforce will be sourced from the Region
  - 75 per cent of the construction workforce will be sourced from the Region
  - 100 per cent of the construction workforce will be sourced from the Region
- this EIA acknowledges that a procurement policy which sources 100 per cent of the construction workforce from the Region is highly unlikely
- when assessing economic impacts associated with the operational stage of the proposal, indirect and total economic benefits have been generated based on the direct input of two-three jobs (FTE) in the *Electricity, Gas, Water and Waste Services Industry: Electricity Distribution*
- it is assumed all operational jobs (FTE) will be sourced from the Region, or workers will relocate to the Region
- a list of assumptions associated with REMPLAN IO methodology are listed in Appendix B.

7.3 Economic locality

The EIA focuses on the Hunter Valley excluding the Newcastle Region (SA4)[32] (hence referred to as the Hunter Valley Region) and NSW. The study area for the economic baseline is presented below in Figure 7-1.

[32] *Statistical Areas Level 4 (SA4) regions are the largest sub-State regions They are specifically designed for the output of ABS Labour Force Survey data. These areas represent labour markets or groups of labour markets within each State and Territory.*

Figure 7-1 Study area for economic baseline



Source: Map developed by bd infrastructure

8 Economic profile

The purpose of the economic profile is to understand the economic context of the Hunter Region. This will provide insight into how the proposal may interact with the Region, identifying opportunities and challenges.

8.1 Key indicators

The economic profile focuses on five key sections to inform an understanding impact of the proposal impacts and benefits across the Regional and State:

- unemployment rates (historical and current)
- regional employment profile
- economic opportunity
- regional exports
- regional value-added.

Collectively, these indicators provide insights into the key economic drivers of the Region and how local communities may engage and interact with regional economies.

8.1.1 Unemployment

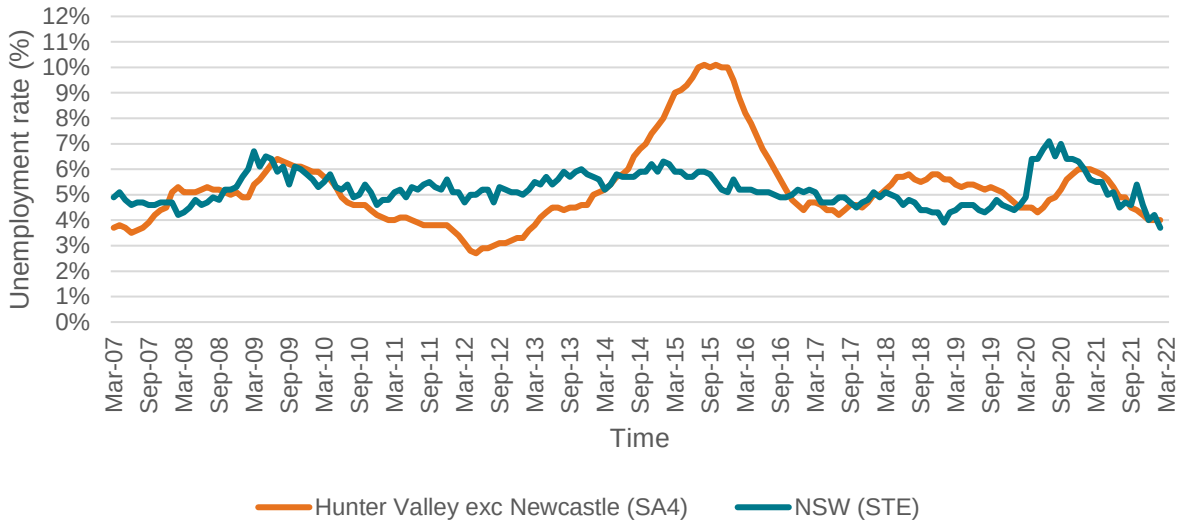
In February 2022, NSW and the Hunter Valley Region had similar unemployment rates (3.7 per cent and 4.0 per cent respectively).

Since 2007, the Hunter Valley Region has experienced notably different unemployment trends compared to NSW, shown below in Figure 8-1. Since 2020 and the beginning of COVID-19 in Australia, the Hunter Valley Region has experienced:

- a notably lower peak unemployment rate during COVID-19 compared to the rest of NSW
- a delayed rise in unemployment rates associated with COVID-19 lockdowns.

Collectively, unemployment data indicates that the Hunter Valley Region has unique economic drivers which are not common across the rest of the NSW. This is reflected by notably high and low peak unemployment rates, which trend away from the NSW average (specifically 2012 and 2015), and more recently unemployment trends during COVID-19.

Figure 8-1 Unemployment rate for the Hunter Valley exc. Newcastle Region (SA4) and NSW



Source: Australia Government, Labour Market Insights, Time series Data: All regions (ABS SA4) Time Series February 2022

8.1.2 Regional employment profile

The Hunter Valley Region has approximately 106,581 employed residents and a total of 100,104 local jobs[33]. The top industries of employment within the region, in terms of local employment opportunities are:

- mining (11.0 per cent)
- retail trade (10.7 per cent)
- health care and social assistance (10.7 per cent).

The top industries of employment within the region, in terms of resident employment are:

- health care and social assistance (12.2 per cent)
- retail trade (10.5 per cent)
- mining (9.3 per cent).

The top three industries of resident employment and local employment opportunities highlight the importance of mining as a key industry across the Hunter Valley Region. When considering the differences between local employment opportunities and resident employment within the Region, shown in Table 8-1, it is evident that:

- construction plays an important role in resident employment however it is not the largest provider of employment in the Hunter Valley Region
- mining is the greatest source of employment for the Hunter Valley Region however it is not the largest employer of residents, reflecting either a skills gap in the local workforce or a limited labour pool
- public administration and safety support a relatively high proportion of jobs in the Hunter Valley Region, however, is not a top industry of employment for residents.

Collectively these differences suggest that drivers of resident employment do not equate to residents employed in local jobs.

Considering that construction is a top employer for residents across the Hunter Valley Region and that the proposal will generate construction jobs, it is important to consider the worker to job ratio for the Region. In 2016 there was[34]:

- 9,439 people living in the Hunter Valley Region and working in construction

[33] *ABS 2016*
[34] *ABS 2016*

- 7,335 construction jobs within the Hunter Valley Region.

Regardless of where people travel to for work, there are more construction workers in the Hunter Valley Region than construction jobs. This equates to approximately 0.8 jobs for each resident employed in construction.

Table 8-1 Top industries of employment for residents and top industries of employment in the Hunter Valley Region

Resident employment (top industries)		Local jobs (top industries)	
	Health care and social assistance (12.2 per cent)		Mining (11.0 per cent)
	Retail trade (10.5 per cent)		Retail trade (10.7 per cent)
	Mining (9.3 per cent)		Health care and social assistance (10.7 per cent)
	Construction (8.9 per cent)		Accommodation and food (9.2 per cent)
	Accommodation and food (8.5 per cent)		Public Administration and Safety (8.5 per cent)

Source: ABS, TableBuilder Pro, Industry of employment, Place of work, Place of usual residence, Hunter Valley ex. Newcastle SA4, 2016 Census

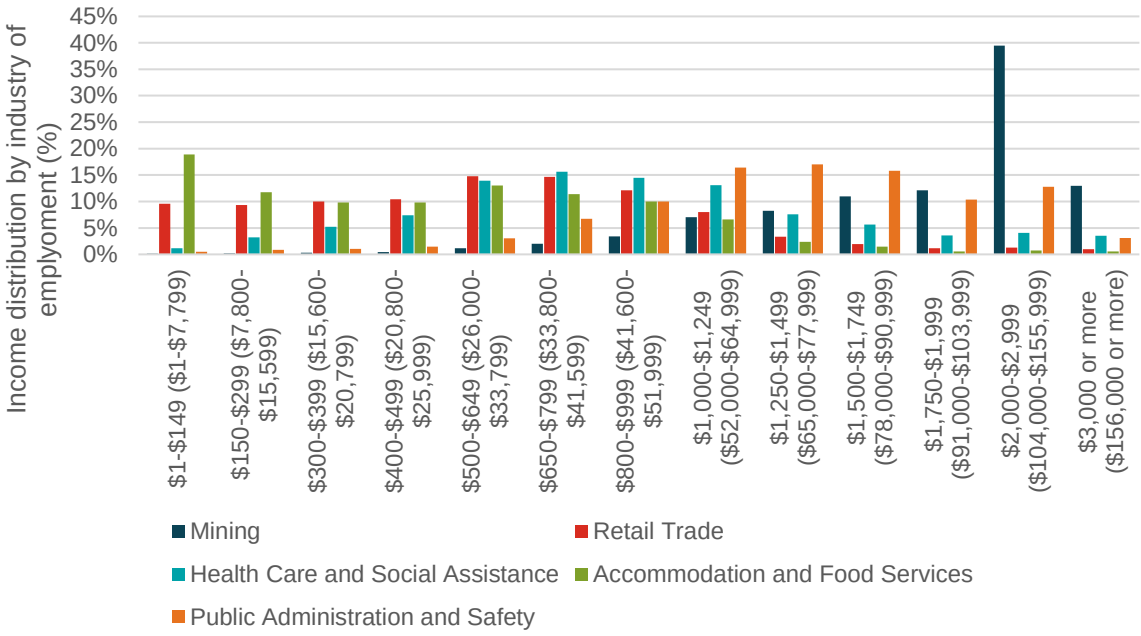
8.1.3 Economic opportunity

Figure 8-2 shows the income distribution of each top industry of employment within the Hunter Valley Region. The distribution of income ranges by the top industries of employment indicates there are substantial differences in economic opportunities between local employment opportunities within the Region. Notably, people working in:

- retail and accommodation and food services generally have access to lower income ranges, with very few opportunities to earn more than $65,000 a year
- health care and social assistance have access to relatively moderate incomes ranges, however limited opportunity to earn upwards of $80,000 a year
- public administration and safety have access to a diversity of incomes ranges, notably most above $52,000 a year and declining opportunity at $156,000 per year
- mining has access to very high-income ranges, with nearly 40 per cent of all mining jobs in the region paying between $104,000 and $156,000 per year.

Differences in economic opportunity between the top industries of employment across the Hunter Valley Region suggest there is the potential for strong economic inequality within the Region. Due to the pay differences between the top industries of employment, some residents and workers may be notably more vulnerable to economic changes in the Region, such as house prices, cost of living, and interest rates. Similarly, residents who are employed in the mining sector may be notably impacted by mine closures considering the limited opportunity to earn high incomes in other industries within the Region. This is referred to as ‘lifestyle lock-in’.

Figure 8-2 Income distribution for top industries of employment within the Hunter Valley exc. Newcastle (SA4)



Source: ABS, TableBuilder Pro, Industry of employment - Place of work, Personal income, Hunter Valley ex. Newcastle SA4, 2016 Census

8.1.4 Regional exports

In 2021, the Hunter Valley Region's exports were estimated to be $28.8 billion[35] [36]. The Hunter Valley Region's strong export economy is primarily driven by the mining sector, representing 63.2 per cent of the Region's total export value ($18.2 billion[37]).

8.1.5 Value-added

In 2021 the Hunter Valley Region generated an estimated $27.6 billion[38] in value-added. Within this $27.6 billion, the mining industry was the most significant value-added contributor with $11.2 billion[39], representing 42.7 per cent of all value-added for the Hunter Region as shown below in Table 8-2. Industry by value-added highlights the importance of the mining sector in the Hunter Valley Region. With over 40 per cent of the Region's value-added, much of the stability and strength of the Region's economy is strongly tied to the performance of the mining sector.

When compared to NSW, the distribution of value-added across industries in the Hunter Valley Region suggests the Region has limited economic diversity. This is reflected by:

- the prevalence of the mining sector
- the low representation of Other industries.

35 $28,798.597 million
36 REMPLAN Economy, Hunter Valley exc. Newcastle SA4
37 $18,212.519 million
38 $27,582.122 million
39 *$11,1778.798 million*

Table 8-2 Top 3 Value added industries for Hunter Valley Region and NSW

Hunter Valley Region	NSW
Mining (42.7 per cent)	Rental, Hiring and Real Estate Services (13.9 per cent)
Rental, Hiring and Real Estate Services (9.8 per cent)	Financial and Insurance Services (13.9 per cent)
Public Administration and Safety (7.9 per cent)	Construction (7.6 per cent)

Source: REMPLAN Economy, Hunter Valley excluding Newcastle (SA4), NSW, Value Added, 2021

9 Economic assessment

9.1 Project expenditure

The total capital investment for the proposal is estimated to be $157.5 million[40] (excluding GST)/$173.2 million[41] (including GST). Economic impacts and benefits will be assessed using a mixture of employment benefits and capital investment as follows:

- construction phase: capital investment of $28.3 million[42]
- operational phase: employment.

9.2 Direct and indirect employment

9.2.1 Construction

The construction of the proposal is expected to generate both direct and indirect employment benefits for both the Hunter Valley Region and the State of NSW. Table 9-1 highlights the potential employment benefit of the proposal, taking into account three local procurement scenarios. The relative success of the local procurement policy recommended in the SIA will impact the employment benefits for the Region. Consequently, capturing:

- 50 per cent of the construction works capital investment in the Hunter Valley Region would support a total of 44 jobs (FTE) for 12 months
- 75 per cent of the construction works capital investment in the Hunter Valley Region would support a total of 66 jobs (FTE) for 12 months
- 100 per cent of the construction works capital investment in the Hunter Valley Region would support a total of 87 jobs (FTE) for 12 months.

It should also be noted that a procurement policy that captures 100 per cent of capital investment is highly unlikely.

Due to the linear nature of the IO model, the relative success of the local procurement policy would proportionally scale the direct and indirect employment benefits.

Input-output analysis estimates that a capital investment of $28.3 million would generate a total of 94 jobs (FTE) within NSW over the 12-month period, as shown below in Table 9-1.

Table 9-1 Total employment benefits: construction

	Capital investment	**Direct employment**	**Indirect employment**		**Total employment**
Location	Direct change Output ($M)	Direct effect	Supply-chain effect	Consumption effect	Total effect
Hunter Valley Region	$14.150 (50 per cent)	34	10	0	**44**
	$21.225 (75 per cent)	51	14	0	**66**

[40] *Estimated at $152,157,700 (excluding GST) by Coutts Cost Consulting, June 2022*

[41] *Estimated at $167,373,470 (including GST) by Coutts Cost Consulting, June 2022*

[42] *Total capital investment minus the cost of the batteries, provided by Coutts Cost Consulting, June 2022*

Location	Capital investment	Direct employment	Indirect employment		Total employment
	Direct change Output ($M)	Direct effect	Supply-chain effect	Consumption effect	Total effect
	$28.300 (100 per cent)	68	18	0	**87**
NSW	$28.300	68	23	1	**94**

Source: REMPLAN, Coutts Cost Consulting, Hunter Valley excluding Newcastle, NSW, 2021

9.2.2 Operation

The operation of the proposal is expected to generate two-to-three jobs (FTE) for at least 20 years. Based on the need for two-to-three jobs (FTE) per annum during operation, the proposal is expected to generate between five and seven jobs (FTE) over the proposal lifespan in the Hunter Valley Region and 10 to 15 jobs (FTE) within NSW, as shown below in Table 9-2.

Table 9-2 Total employment benefits: operation

Scale	Direct employment	Indirect employment		Total employment
	Direct effect	Supply-chain effect	Consumption effect	Total effect
Hunter Valley Region	2.00-3.00	1.78-2.67	0.85-1.27	**4.62-6.93**
NSW	2.00-3.00	4.66-7.00	3.26-4.88	**9.92-14.88**

Source: REMPLAN, Coutts Cost Consulting, Hunter Valley excluding Newcastle, NSW, 2021

9.3 Direct and indirect value-added

9.3.1 Construction

The construction of the proposal is expected to generate both direct and indirect value-added benefits for the Hunter Valley Region and the State of NSW. Table 9-3 below highlights the potential value-added benefit of the proposal, taking into account three local procurement scenarios. The relative success of the local procurement policy recommended in the SIA will impact the employment benefits for the Region. Consequently capturing:

- 50 per cent of the construction works capital investment in the Hunter Valley Region would generate $5.993 million in value-added
- 75 per cent of the construction workforce from the Hunter Valley Region would generate $8.9 million in value-added
- 100 per cent of the construction workforce from the Hunter Valley Region would generate $11.866 million in value-added.

It should also be noted that a procurement policy that captures 100 per cent of capital investment is highly unlikely.

Due to the linear nature of the input-output model, the relative success of the local procurement policy would proportionally scale the value-added benefit.

NSW could expect a value-added benefit of $12.680 million during the construction phase of the proposal.

Table 9-3 Total value added: construction

Scale	Capital investment	Direct value-added	Indirect value-added		Total value-added
	Direct change Output ($M)	Direct effect ($M)	Supply-chain effect ($M)	Consumption effect ($M)	Total effect ($M)
Hunter Valley Region	$14.150 (50 per cent)	$4.627	$1.175	$0.031	**$5.933**
	$21.225 (75 per cent)	$6.941	$1.912	$0.047	**$8.900**
	$28.3 (100 per cent)	$9.254	$2.549	$0.062	**$11.865**
NSW	$28.3	$9.254	$3.260	0.166	**$12.680**

Source: REMPLAN, Coutts Cost Consulting, Hunter Valley excluding Newcastle, NSW, 2021

9.3.2 Operation

During the operation of the proposal, the Hunter Valley Region is estimated to experience $2.197-$3.295 million in total value added per annum, while NSW is estimated to experience $3.158-$4.736 million total value added per annum, as shown below in Table 9-4.

Table 9-4 Total value-added: operation

Scale	Direct value-added	Indirect value-added		Total value-added
	Direct effect ($M)	Supply-chain effect ($M)	Consumption effect ($M)	Total effect ($M)
Hunter Valley Region	$1.271-$1.907	$0.687-$1.031	$0.238-$0.357	**$2.197-$3.295**
NSW	$1.137-$1.706	$1.377-$2.066	$0.643-$0.965	**$3.158-$4.736**

Source: REMPLAN, Coutts Cost Consulting, Hunter Valley excluding Newcastle, NSW, 2021

9.4 Other economic benefits

9.4.1 Regional construction industry benefits

Considering the economic profile presented in this EIA, the construction phase of this proposal will support new construction jobs in the Hunter Valley Region. Noting that construction is a major industry of employment for residents in the Region, the construction phase of the proposal will support and strengthen the local construction industry, providing new local employment opportunities.

9.4.2 Diversifying the Regional economy

Noting the substantial prevalence of mining in the Hunter Valley Region (in terms of employment, employment opportunity, Regional export and Regional value-added), the proposal is expected to provide direct and indirect employment and value-added in industries that are not related to mineral extraction. While there is likely to be an overlap of required skills between the proposal and the mining industry (such as electrical engineering, construction services, and project management), the proposal presents new and diverse employment and value-added benefits for the Region.

9.4.3 Supporting renewable energy sector investment in NSW

Supporting infrastructure, such as the proposal, will increase the viability and feasibility of new renewable energy projects within the Hunter Valley Region and across NSW. In 2018, there was over $18 billion worth of renewable

energy projects (wind and solar) progressing through the NSW planning approval system[43]. As more BESS projects come online and the firmness of renewable energy increases, the net value of renewable energy projects will likely continue to increase.

In 2020, the Reserve Bank of Australia (RBA) commented that 25-40 per cent of the value of large-scale renewable energy generators was captured by local content such as labour and materials sourced domestically[44]. Based on the net value of renewable energy projects in NSW in 2018 and a local content engagement rate of between 25-40 per cent, as per the RBA's comments, in 2018 the renewable sector contributed between $4.5-$7.2 billion to Regional, State and National economies. Primarily local content has focused on engineering, construction and installation services.

The estimates above do not consider the economic benefit generated in local areas through the provision of accommodation, food services, fuel and logistics support.

Consequently, investing in network infrastructure which supports the firmness and uptake of renewable energies will directly support current and new large scale renewable energy projects in the Region. The continued investment in renewable energy projects will continue to have positive economic impacts on local content and local expenditure.

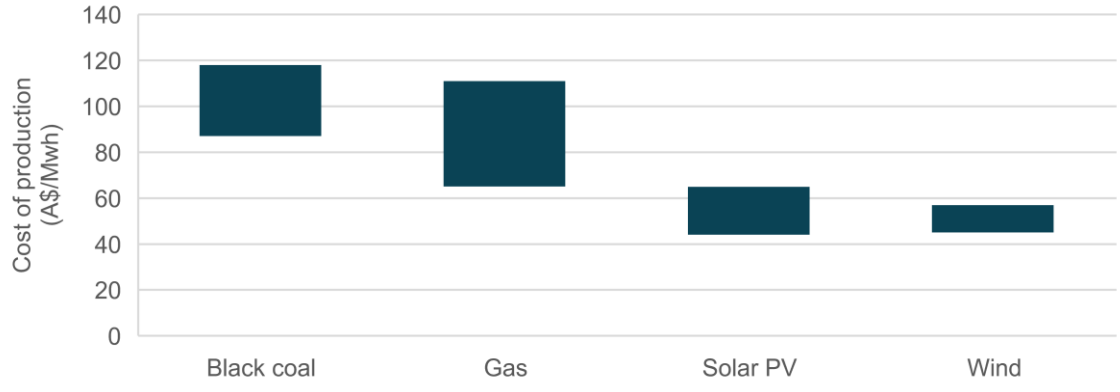
9.4.4 Increasing access to low generation cost electricity

In December 2021, the CSIRO released their *GenCost 2021-2022: Consultation Draft,* which identified wind and solar as the cheapest source of new electricity supply, even after the cost of storage and network investment. The report estimates that solar PV and wind have notably cheaper generation costs ($44-$65/Mwh and $45-$57/Mwh respectively) compared to black coal and gas ($87-$118/Mwh and $65-$111/Mwh respectively), as shown below in Figure 9-1.

The report comments that over the next three decades, the generation cost of renewable energy is likely to decrease while the cost of fossil fuel energy production will likely remain unchanged. However, the generation cost of fossil fuel energy production could increase due to the introduction of new environmental or climate change policies.

Generation cost data suggests the Hunter Valley Region and NSW will unlikely experience a decrease in electricity prices over the next thirty years if fossil fuel remains the primary energy source. Projects such as the proposal will provide infrastructure that supports the firmness of renewable energy in the electricity network, unlocking the viability of low generation cost electricity. In turn this will have a greater capacity to reduce household electricity costs both Regionally and across NSW.

Figure 9-1 Generation cost of different energy sources



Source: CSIRO, GenCost 2021-2022: Consultation Draft (December 2021); Michael Mazengarb via RenewEconomy, 2021.

[43] *Energy NSW, The renewable energy project pipeline, 2020*
[44] *Reserve Bank of Australia, Renewable energy investment in Australia, March 2022,*

10 Economic impact assessment conclusion

The proposal has the potential to generate a range of economic benefits within the Hunter Valley Region and NSW economies. These include:

- 34-68 direct and 10-18 indirect construction services jobs (FTE) and $4.627-$9.254 million direct and $1.206-$2.611 million indirect value added to the Hunter Valley Regional economy over the 12-month **construction phase**
- 68 direct and 18 indirect construction services jobs (FTE) and $9.254 million direct and $3.426 million indirect value added to the NSW economy over the 12-month **construction phase**
- 2-3 direct and 3-4 indirect electricity distribution jobs (FTE) and $1.271-$1.907 million direct and $0.925-$1.388 million indirect value added per annum to the Hunter Valley Regional economy during **operation phase**
- 2-3 direct and 8-12 indirect electricity distribution jobs (FTE) and $1.137-$1.706 million direct and $2.021-$3.030 million indirect value added per annum to the NSW economy during **operation phase.**

In addition to employment benefits and increased value-added, the proposal is expected to:

- directly strengthen and support the construction industry within the Hunter Valley Region, an important industry of employment for residents
- provide new employment opportunities in the electricity distribution industry, supporting economic diversification in the Region while supporting the Region's vision to remain an energy production hub
- indirectly support future capital investment in renewable energy projects in the Region and across NSW, further stimulating Regional and State economies
- indirectly support the viability of cheaper electricity generation cost sources, such as wind and solar, by contributing to network firming with the potential to provide cheaper household electricity costs to households in the Region, and to a lesser extent NSW.

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bd infrastructure

Appendix

A. Data note

This SIA and EIA were prepared between April and July 2022, with the first round of 2020 Census data due to be published in June 2022. Consequently, 2020 Census data was not utilised for this assessment with the following advice issued from DPE:

- all SIAs commencing after census data is released (June 2022), and all projects with SEARs issued after this date, will be required to use the updated census data
- otherwise, where an SIA practitioner expects that updated census data may provide materially different results, this should be identified as an assumption and the associated uncertainties described
- secondary data, including census data, should of course not be the only input into SIAs. Engagement outcomes and other primary research data and insights should be used to triangulate information to understand social conditions.

Based on this guidance, this SIA and EIA have utilised 2016 Census data, other secondary data sources and engagement outcomes to inform the social and economic baselines of the assessment.

B. Assumptions

Economic Estimates and Impact Modelling Assumptions REMPLAN incorporates an input–output methodology and the underlying assumptions of this approach need to be kept clearly in mind. The assumptions are listed below:

- Fixed production coefficients. That is to say that if we wanted to double output of a particular industry sector, we would have to double all of its inputs with no evidence of scale economies. This assumption implies constant returns to scale.
- Regional performance matches national and state average performance. While this can vary between industries these differences are usually apparent in other aspects of the economy.
- Input proportions will remain the same and there will be no change in technology. As long as the model is kept up to date this latter concern should not pose a threat to its effectiveness, except as a tool for long-term forecasting.
- Homogeneity among industries. It is assumed that each industry sector produces a fixed set of products that are not produced by any other sector. It is however possible to have some overlap e.g. liquor sold in bottle shops (the Retail sector) and in cafes (the Accommodation, Cafes and Restaurants sector).
- No supply constraints. It is assumed that the intermediate and household sectors are able to service any increases in final demand. This assumption could weaken the predictive capacity of the model in those cases where increases in overall demand could bring about input shortages and raise their prices in the short term. However, in most day-to-day cases increased input demand should not present a problem.

All figures, data and commentary presented in this software are based on data sourced from the Australian Bureau of Statistics (ABS), most of which relates to the 2016, 2011, 2006 and 2001 Censuses.

C. Social impacts and benefits not carried forward

Scoped social impact	Project stage	Description	Nature	Social Impact Category	Social Impact rating	Sources	Comments
Increased demand for temporary accommodation	Construction	Increased demand for temporary accommodation can place increasing pressure on existing temporary accommodation, impacting tourism opportunities and vulnerable groups who require access to temporary accommodation.	Negative	Way of life, Accessibility	**Low (D1)**	Proposal details	Due to the relatively low construction workforce and limited construction period, it is anticipated this impact will be a low
Impact on historic and Aboriginal heritage and culture	Construction		Negative	Culture	**Low (C1)**	Iris, *Aboriginal Cultural Heritage and Historic Heritage Assessment (2022)*	
Employment	Operation	New employment opportunities for the operational life span of the proposal, proving livelihoods opportunities in the local area.	Positive	Livelihoods	**Low (A1)**	Proposal details	While the proposal will generate the need for 2-3 FTE jobs per annum during the operation, the magnitude of this benefit is very low, resulting in low social benefit
Traffic	Operational	Increased traffic can impact how people access the local area, with increased traffic and travel time often associated with negative lifestyle and liveability outcomes	Negative	Accessibility	**Low (A1)**	Proposal details	During operation the assessed increase in traffic of up to two vehicle movements per hour would result in negligible change to the traffic environment.

Scoped social impact	Project stage	Description	Nature	Social Impact Category	Social Impact rating	Sources	Comments
Increased firmness of renewable energy projects	Operational	BESS indirectly support the viability and reliability of renewable energy projects. Increased representation of renewable energy sources in the electricity mix supports environmental and sustainability benefits.	Positive	Way of life	**Low (B1)**	Policy review	This is a cumulative benefit when combined with other BESS in the network. Considering the relatively small size of this BESS, this benefit is expected to be low
Reduction in electricity prices	Operational	Considering the current electricity crisis and increasing cost of living, the ability to reduce electricity prices would have a direct benefit on households. This benefit is more significant for vulnerable households.	Positive	Way of life	**Low (D1)**	CSIRO, *GenCost 2021-2022: Consultation Draft (2021)*	This is a cumulative benefit when combined with other BESS in the network. Due to the limited ability for the proponent to direct benefits to the local area, and the relatively small size of the BESS, reduction in electricity prices is a low social benefit with high uncertainty

D. Community survey outcomes

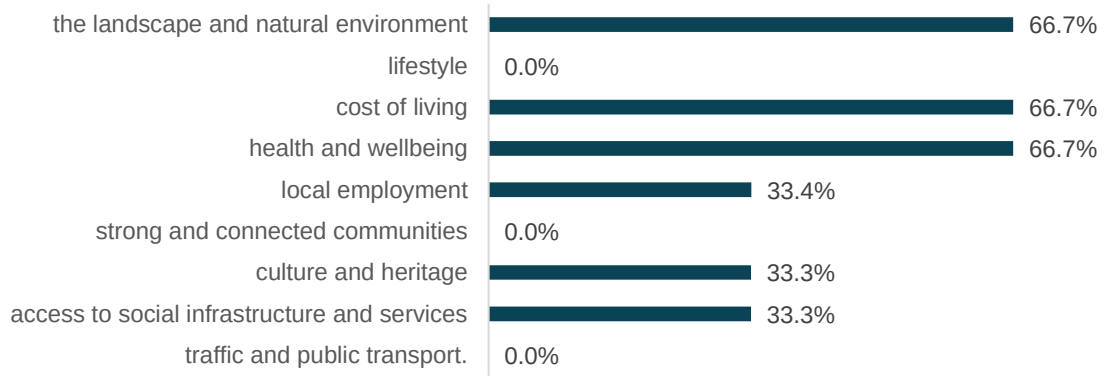
Summary of responses

Q1: Landing page inviting participation in the survey.

Q2: Thinking about your local area, please select which of the following are most important to you [please select up to three choices] (n=3):

Health and wellbeing, cost of living and the landscape and natural environment were all identified by respondents as being highly important, with two out of three respondents selecting them.

Question 2: Thinking about your local area, please select which of the following are most important to you



Q3: In your own words, please describe what is important about your local area to you (n=2)

Only two respondents provided additional information. One response was not relevant. The other response primarily identified environmental topics such as, but not limited to, biodiversity, regeneration and climate change.

Q4: Thinking about your local area, please describe some of the challenges you believe you and/or your community face. This may include but is not limited to: cost of living, access to local employment, services, crime, environmental protection, natural hazards, etc. (n=2)

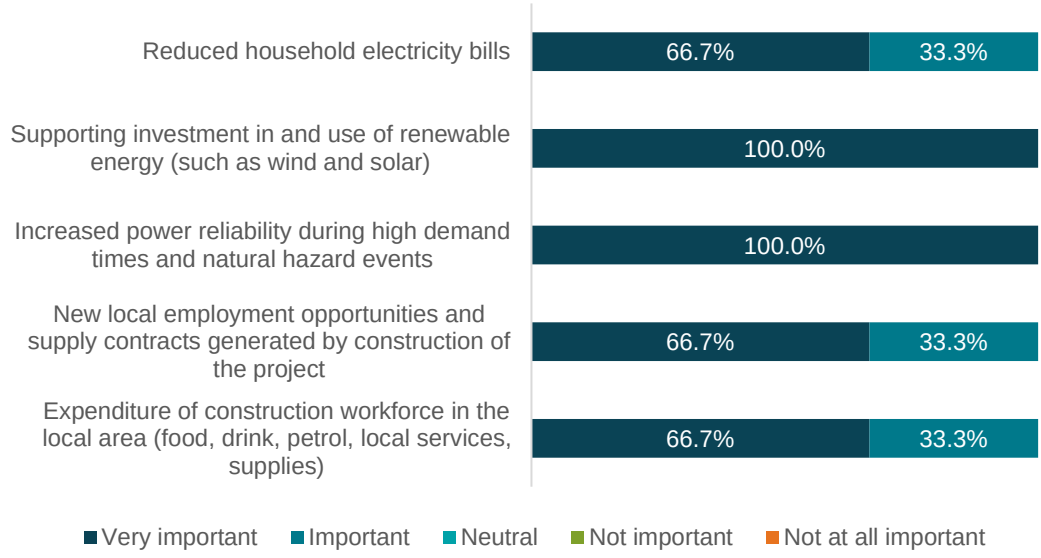
Only two respondents provided additional information. One respondent commented on the need for better medical facilities and transport. The other respondent commented on environment challenges such as climate change, hazards associated with synthetic fertilisers and pesticides.

Q5. Thinking about this project and energy storage system projects in general, how important are the following potential benefits? (n=3)

All respondents (100 per cent) agreed that *supporting investment in and use of renewable energy* and *increased power reliability during high demand times and natural hazard events* as very important potential benefits associated with the proposal.

Reducing household electricity bills, new local employment opportunities and expenditure spend related to the proposal were identified as very important by to thirds of respondents (66.7 per cent) and important by one third of respondents (33.3 per cent).

Question 5: Thinking about this project and energy storage system projects in general, how important are the following potential benefits?



Q6. If there are any other potential benefits that you believe are important, please list them below (n=2)

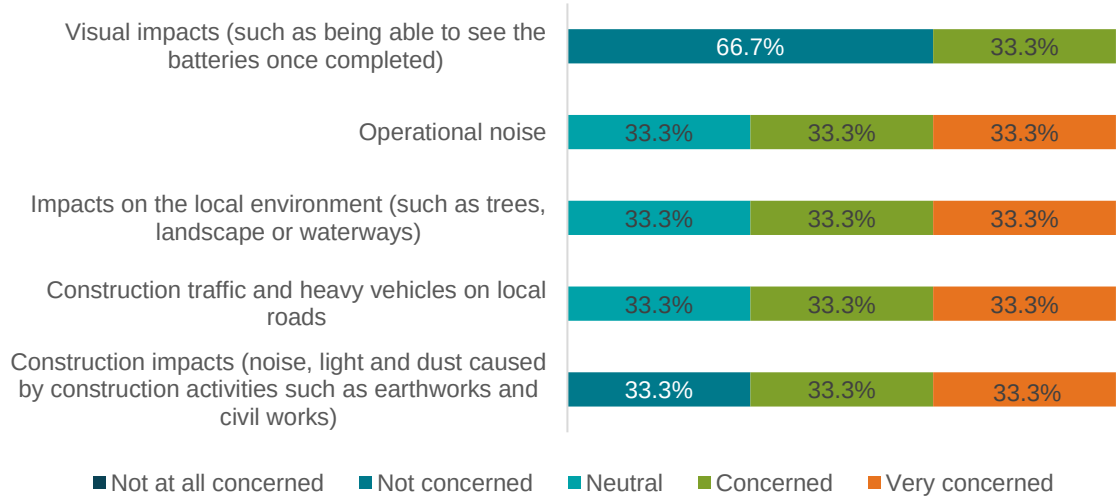
Only two respondents provided additional information. One response was not relevant. The other response commented that there were environmental benefits associated with the proposal.

Q7. Thinking about this project, how concerned are you with the following potential issues? (n=3)

Respondents expressed mixed views regarding project concerns. These included:

- two thirds of respondents (66.7 per cent) were not concerned about visual impacts associated with the proposal, while one respondent (33.3 per cent) was concerned
- there were vary degrees of concern regarding operational noise, impacts on the local environment and construction traffic
- one respondent (33.3 per cent) was not concerned about construction impacts, while one respondent (33.3 per cent) was concerned and another (33.3 per cent) very concerned.

Question 7: Thinking about this project, how concerned are you with the following potential issues?



Q8. If there is anything else you are concerned about, please list it below (n=2)

Only one respondent provided a relevant comment. It was recommended that low growing vegetation be used to protect the batteries.

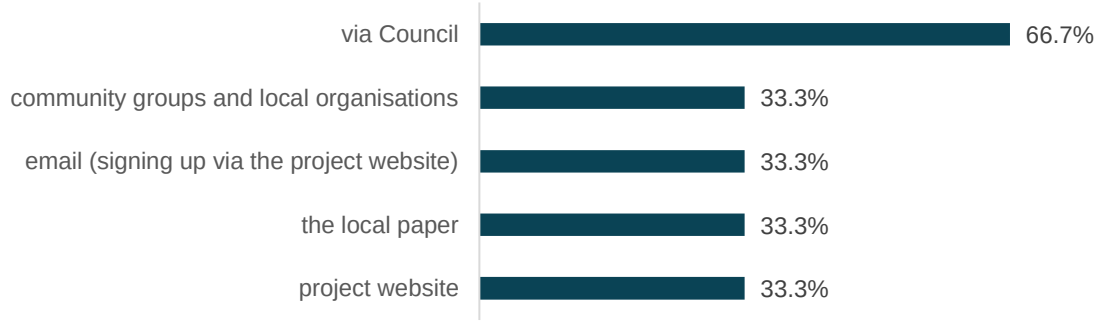
Q9. How interested are you in being informed and updated about this project (n=3)

All respondents (100.0 per cent) were interested in being informed and updated about the proposal.

Q10. How would you like to be informed about this project in the future? Please select all which apply (n=6, multiple responses allowed)

The preferred communication method by respondents was Council (66.7 per cent).

Question 10: How would you like to be informed about this project in the future? Please select all which apply



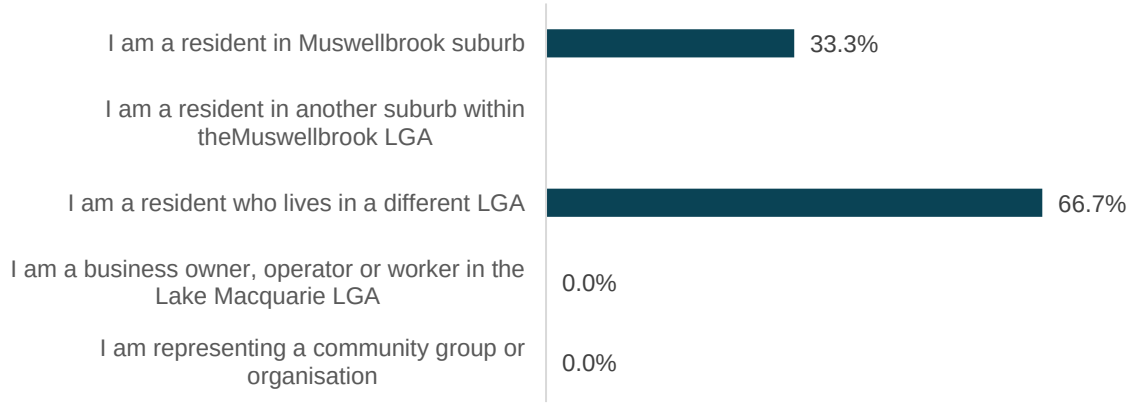
Respondent profile

One respondent (33.3 per cent) was from the Muswellbrook suburb, while the other two respondents (66.6 per cent) were residents from a different LGA.

Other demographic characteristics of the respondent profile include:

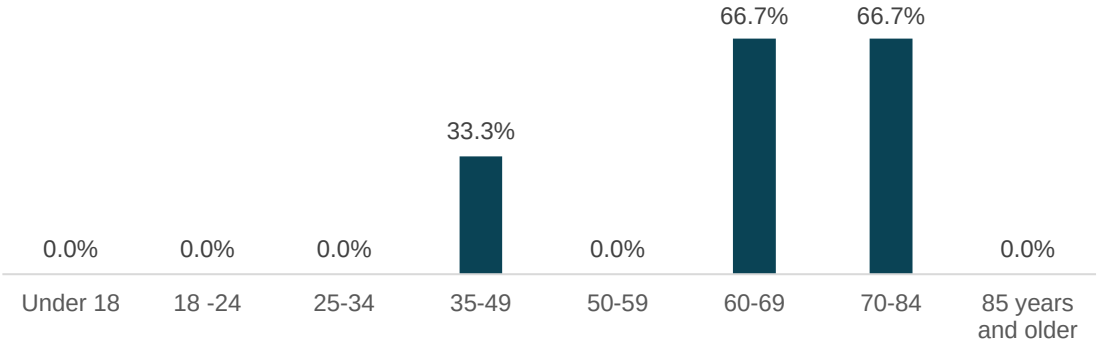
- two out of three respondents were women (66.7 per cent)
- two out of three respondents were aged between 60 and 84 (66.7 per cent).

Question 12: Which of the following best describes you? (n=3)



Question 13: Which of the following best describes you? (n=3)

Question 14: How old are you? (n=3)



E. Engagement record

Social Impact Assessment Engagement Record

Stakeholder	Action	Response
Muswellbrook Shire Council	Interview request	Accepted
The Sustainability Hub	Interview request	Accepted
Committee for the Hunter	Interview request	Notaccepted
Hunter Businesses	Interview request	No response
Sandy Hollow Progress Association	Interview request	No response
Wanaruah Local Aboriginal Land Council	Interview request	No response
Residents from McCully's Gap (2 separate contacts)	Interview request	No response
Muswellbrook Chamber of Commerce	Interview request	Not accepted
Transition Newcastle	Interview request	No response
Hunter Environment Institute	Interview request	No response
Upper Hunter Community Services Inc.	Interview request	No response

FIRM POWER
Affordable. Reliable. Sustainable.

26, May 2022

Dear [redacted],

A BATTERY ENERGY STORAGE SYSTEM PROPOSAL FOR MUSWELLBROOK

Firm Power is proposing to develop a Battery Energy Storage System BESS (BESS) in Muswellbrook on approximately 4.0 hectares of land located at 20-24 Sandy Creek Road, Muswellbrook to the existing Ausgrid Muswellbrook Substation. The proposed BESS System includes a 150-megawatt (MW) stand-alone battery that will be used to store and provide power to the local energy grid. A project fact sheet is included with this letter.

The project has been identified as a State Significant Development with environmental assessment requirements issued by the Department of Planning and Environment in late 2021. In line with these requirements , we are preparing a Socio-economic Impact Assessment (SEIA) to support the Development Application and accompanying Environmental Impact Assessment.

To inform the SEIA, we are engaging with local stakeholders to understand:

- the local social environment
- the local economic environment
- key local issues, challenges, values, and strengths
- potential impacts and benefits of the project for local communities and the broader region.

We would like to speak to a representative of your organisation to better understand the topics listed above. Muswellbrook Shire Council's insights would contribute greatly to the development of the SEIA and we would welcome the opportunity to discuss this project in greater detail with you in an interview. It is expected that the interview (either telephone or video call) will take 45 minutes, with a discussion guide provided to you prior. We are also available to provide a general project briefing in advance of the interviews if desired.

We have engaged bd infrastructure to undertake the interviews and community engagement activities for the SEIA on behalf of Firm Power.

Kind Regards,

N Rose

Nick Rose
GENERAL MANAGER

HUNTER DISPATCHABLE ENERGY SYSTEM

FIRM POWER

MUSWELLBROOK BESS PROJECT

The Hunter Dispatchable Energy System (HDES) is a distributed battery system planned in the Hunter region which will support the performance and uptake of renewable energy in NSW.

As As part of the HDES, Firm Power is proposing to develop a 150MW Battery Energy Storage System (BESS) adjacent to the existing Ausgrid Muswellbrook substation. The BESS will allow energy to be stored, and released back into the local electricity network when it is needed.

The Muswellbrook BESS project is currently in the planning phase with an Environmental Impact Statement (EIS) planned for public display and consultation later this year. BESS projects at Awaba and Beresfield are also in development.

BATTERY ENERGY STORAGE SYSTEMS (BESS)

Today's energy system is moving increasingly towards energy generation sources with a variable output such as wind and solar. Storage solutions like the Muswellbrook BESS project help the grid balance variable renewable energy sources by:

- storing excess low cost energy during periods of low demand, and
- dispatching stored energy during periods of high demand.

This places downward pressure on prices, supporting renewable energy generation and a transition towards a more sustainable energy system.

Battery systems are also the most flexible energy storage and generation technology, with the ability to respond to the energy demand almost instantaneously.

HOW WILL THE PROJECT AFFECT YOU?

Construction of the Muswellbrook BESS is proposed to commence in late 2023 and will take around 12 months to complete. The local community near the site may experience some impacts during construction and operation. Firm Power will seek to limit these impacts wherever possible.

During construction:

- Increased truck and vehicle movements along Sandy Creek Road.
- Dust impacts from clearing and earthworks.
- Minor noise impacts from vegetation removal and construction works.

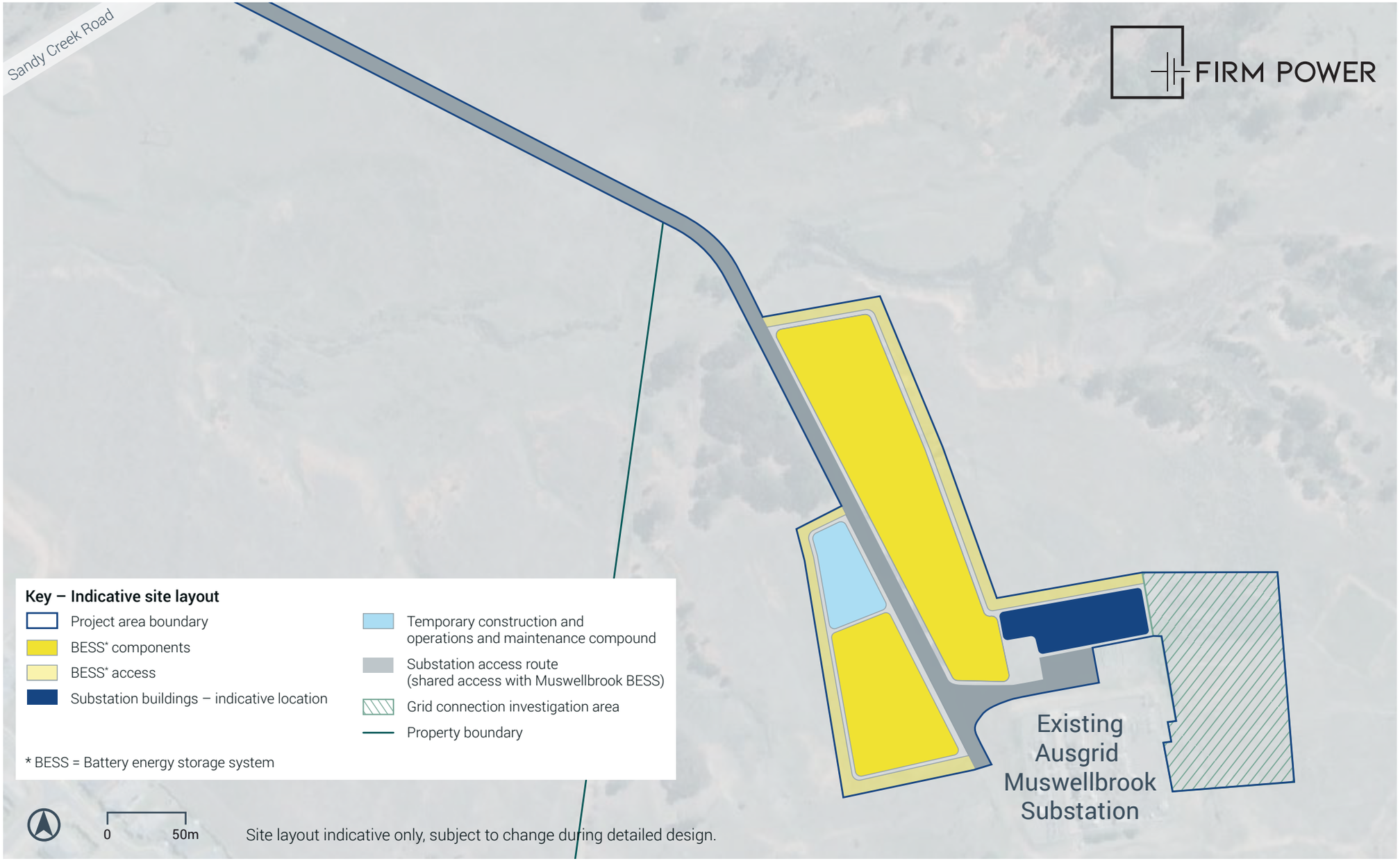
During operation:

- Changes to visual amenity from removal of vegetation and installation of electrical equipment.
- Low level noise from battery cooling systems and operation.

WE WANT YOUR FEEDBACK

As part of the EIS process, Firm Power has engaged bd infrastructure to undertake a community survey to better understand how this project may impact or benefit local communities and the broader region.

To complete the survey, please scan the QR code, or visit **surveymonkey.com/r/MuswellbrookBESS**



GET IN TOUCH

For more information or to speak to a member of the project team, please get in touch via: **Phone: 1800 749 338** **Email: info@firmpower.com.au** **Website: firmpower.com.au**

Firm Power is also interested in talking to members of the community who have an interest in energy storage or who would like to discuss education, provision of services or employment opportunities that may exist in the future.

HUNTER DISPATCHABLE ENERGY SYSTEM

FIRM POWER

MUSWELLBROOK BESS PROJECT

Firm Power is proposing to develop a 150MW Battery Energy Storage System (BESS) next to Ausgrid's Muswellbrook substation. The battery will allow energy to be stored, and released back into the local electricity network when it is needed. Energy storage systems play an important role in supporting renewable energy generation and a transition towards a more sustainable energy system.

WE WANT YOUR FEEDBACK

As part of the planning process, Firm Power is conducting a community survey to better understand local views about how this project may impact or benefit local communities and the broader region.

To give your thoughts on the project please scan the QR code, or visit **surveymonkey.com/r/MuswellbrookBESS**

GET IN TOUCH **Phone: 1800 749 338** **Email: info@firmpower.com.au** **Website: firmpower.com.au/muswellbrook**

GPO BOX 676 North Sydney NSW 2059
www.bdinfrastructure.com
ABN 84 161 384 596

bd infrastructure

Discussion Guide

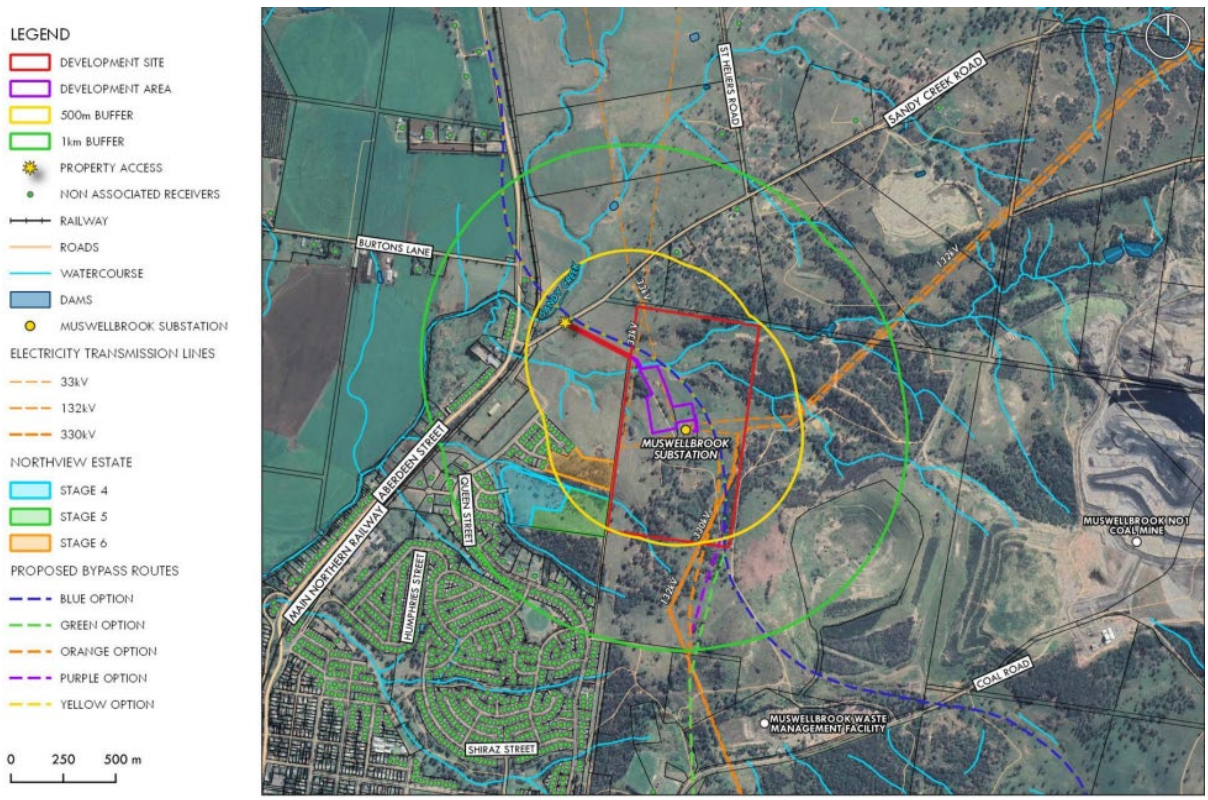
Firm Power is proposing to develop an approximately 150-Megawatt AC (MWAC) Battery Energy Storage System (BESS) on land adjacent to the Ausgrid Muswellbrook substation. The proposal is located in the Muswellbrook Shire Council (MSC) Local Government Area (LGA), within the Hunter region of NSW, approximately 2.5 km north-east of the town of Muswellbrook. The project is to be known as the Muswellbrook BESS.

The subject site is at 20-24 Sandy Creek Road, Muswellbrook. The site has an area of approximately 62.76 hectares and the proposed project has a development area of approximately 4 hectares.

The site and distribution of surrounding residents and businesses (non associated receivers) is shown below in Figure 2-3.

The Muswellbrook BESS includes:

- installation of containerised lithium-ion batteries with a capacity of up to 150 MW and 600 MW-hours, with associated power conversion systems, switchgear and a control building
- an underground or overhead 33kV or 132 kV sub-transmission line to connect the BESS to the Muswellbrook substation
- cabling and collector units, storage area, internal access tracks, on-site parking, security fencing, lighting and temporary construction laydown area; and
- utilisation of existing site access arrangements from Sandy Creek Road.



Project status

The project team is currently preparing an EIS in response SEARs issued by the NSW Department of Planning Environment. As part of the EIS, bd infrastructure is undertaking community engagement and a socio-economic impact assessment (SEIA) to support the EIS.

Discussion Guide

Discussion themes	Discussion points
Introductions	bd infrastructure is undertaking community engagement, on behalf of the proponent Firm Power, to support the develop of an EIS and Socioeconomic Impact Assessment (SEIA) for the proposed Muswellbrook Battery Energy Storage System (BESS). The proposed site is located at 20-24 Sandy Creek Road, Muswellbrook, within the Muswellbrook Shire LGA.
Topic 1: local community	As part of undertaking a SEIA, we are interested in understanding the local community. Based on our desktop analysis, we understand that Muswellbrook suburb has: - a high representation of First Nation Australians - a relatively younger population - notable differences in earning potential Are there other defining demographic characteristics or recent trends relevant to these areas? How and why is disadvantage distributed across the suburb? Has Council experienced any population or social trends since COVID-19?
Topic 2: Community strengths and challenges	Are there specific localised issues and values which you are aware of? What are some of the key community strengths of the suburb? Are there any unique social or economic challenges the suburb experiences?
Topic 3: Project site	Thinking about the project site, is there anything from a social or economic perspective which Council is concerned about? Is there anything which the SEIA should consider? What does Council believe is the most important mitigation measure the proponent can do, regarding site location? Do you think the proposed site is appropriate?
Topic 4: Battery Energy Storage Systems	Key benefits of the project include: - increasing the firmness of the electricity network - support increased uptake of renewable energy as a primary power source - increase network reliability during high demand periods and natural hazards Based on the brief description of benefits, are any specific benefits more important to the local area than others? If so, why? Are there any benefits which have not been raised? Key impacts of the project include: - construction impacts (amenity, traffic) - operation (visual, operational noise) Based on the brief description of impacts, are any specific impacts potentially more significant to the local area than others? If so, why? Are there any benefits which have not been raised?