Amber

Traffic & Transportation Direction

Muswellbrook Battery Energy Storage System

20-24 Sandy Creek Road, Muswellbrook

Traffic Impact Assessment

July 2022

Reference: 373 rep 220726 final

Muswellbrook Battery Energy Storage System

20-24 Sandy Creek Road, Muswellbrook

Traffic Impact Assessment

Prepared for: Firm Power

Status: Final report

Date: 26 July 2022

Reference: 373 rep 220726 final

Contact

Website: www.amberorg.com.au E: info@amberorg.com.au Phone: 1800 022 363

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1. Background

1.1 Background

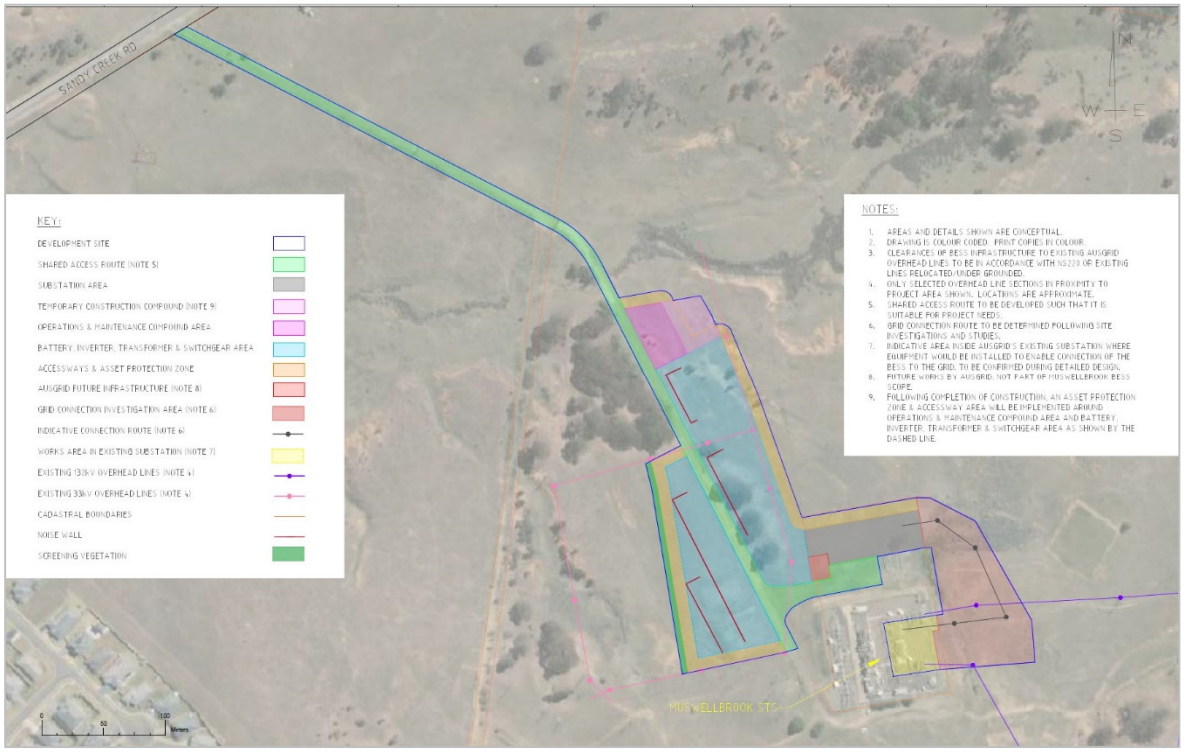
Amber Organisation Pty Ltd has been engaged by Firm Power to conduct a review of the traffic implications of the Muswellbrook Battery Energy Storage System (BESS) and prepare a Traffic Impact Assessment.

The BESS is proposed to have a capacity of 150MW and is located at 20-24 Sandy Creek Road, Muswellbrook. Construction is expected to take approximately 12 months, with the peak construction period expected to take 5 months. A maximum of 75 staff will be on-site during peak construction periods.

Access to the site is proposed via an existing access driveway located on Crown reserve that connects to the State road network via Sandy Creek Road (municipal road) and New England Highway (State road). Staff are expected to primarily be located in Muswellbrook, with all plant expected to be delivered from Port of Newcastle.

Figure 1 shows the proposed layout of the site in relation to the road network, access locations and existing infrastructure.

Figure 1: Site Layout



Source: Firm Power

1.2 Environmental Assessment Requirements

NSW Department of Planning & Environment issued Secretary's Environmental Assessment Requirements (SEARs) for the project. The required traffic and transport matters include the following:

- *An assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail;*
  (refer Section 3)
- An assessment of the likely transport impacts to the site access route, *site access point(s), particularly in relation to the capacity and condition of the roads*;
  (**refer Section 4)**
- *A cumulative impact assessment of traffic from nearby developments; and*
  (refer Section 3.4)
- *Provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authorities.*
  (refer Section 4.3)

1.3 Purpose of Document

This Traffic Impact Assessment has been prepared to assess the construction, operational and decommissioning traffic impacts, and the access arrangements of the BESS. The assessment responds to the SEARs and details how road impacts of the project traffic, particularly from heavy vehicle use and oversize and overmass vehicles, will be avoided or managed using road-use management strategies.

More specifically, the report addresses the following key matters:

- Details of both light and heavy vehicle traffic volumes and proposed transport routes;
- An assessment of the potential traffic impacts of the project on road network function and safety;
- An assessment of the capacity of the existing road network to accommodate the type and volume of traffic generated by the project;
- Details of measures to mitigate and / or manage potential impacts, including construction traffic control, road dilapidation surveys and measures to control soil erosion and dust generated by traffic volumes; and
- Details of access roads and how these connect to the existing road network and ongoing operational maintenance.

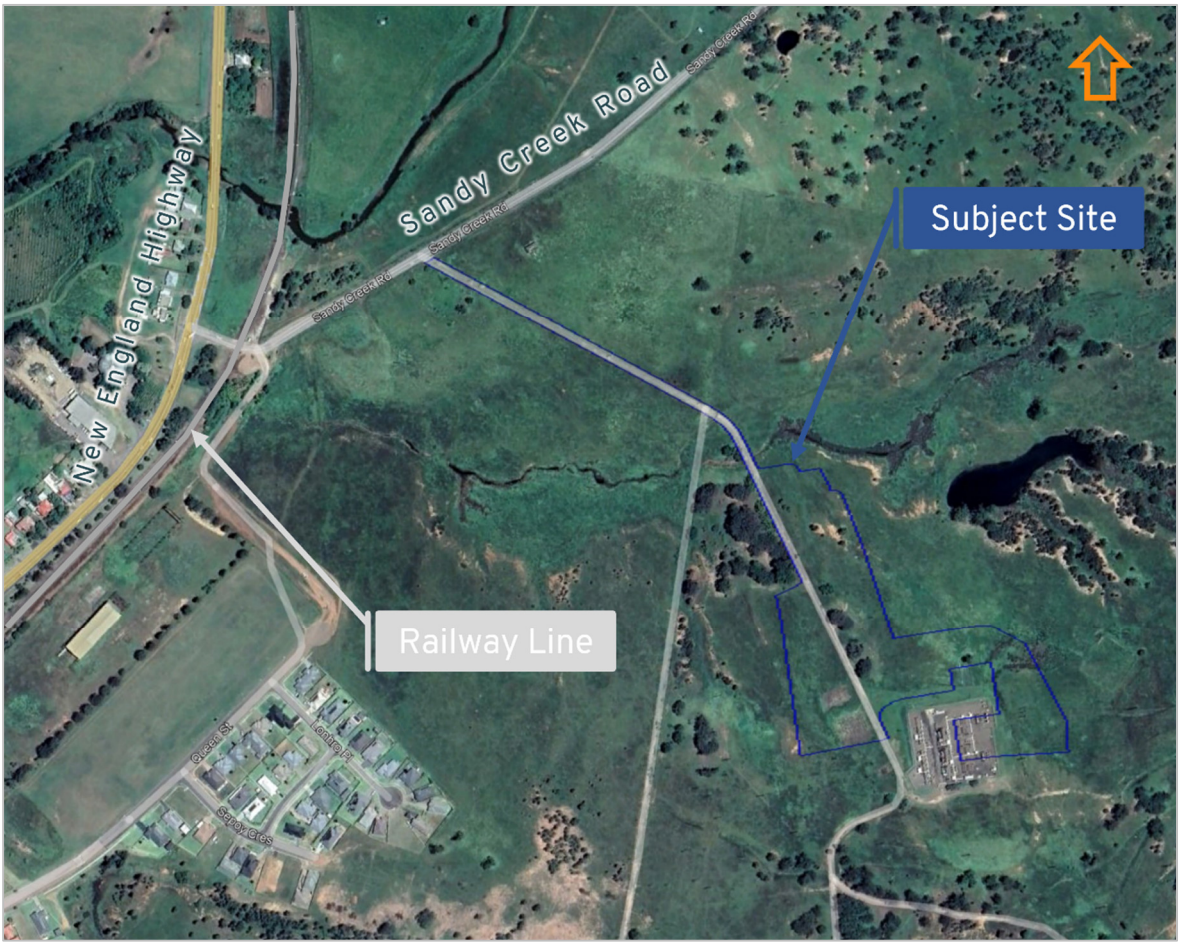
The traffic assessment has been undertaken in conjunction with consultation with Transport for NSW and Muswellbrook Shire Council.

2. Existing Conditions

2.1 Site Location

The site is located at 20-24 Sandy Creek Road approximately 2.5 kilometres northeast of Muswellbrook. Figure 2 shows the location of the site in relation to the surrounding transport network.

Figure 2: Site Location

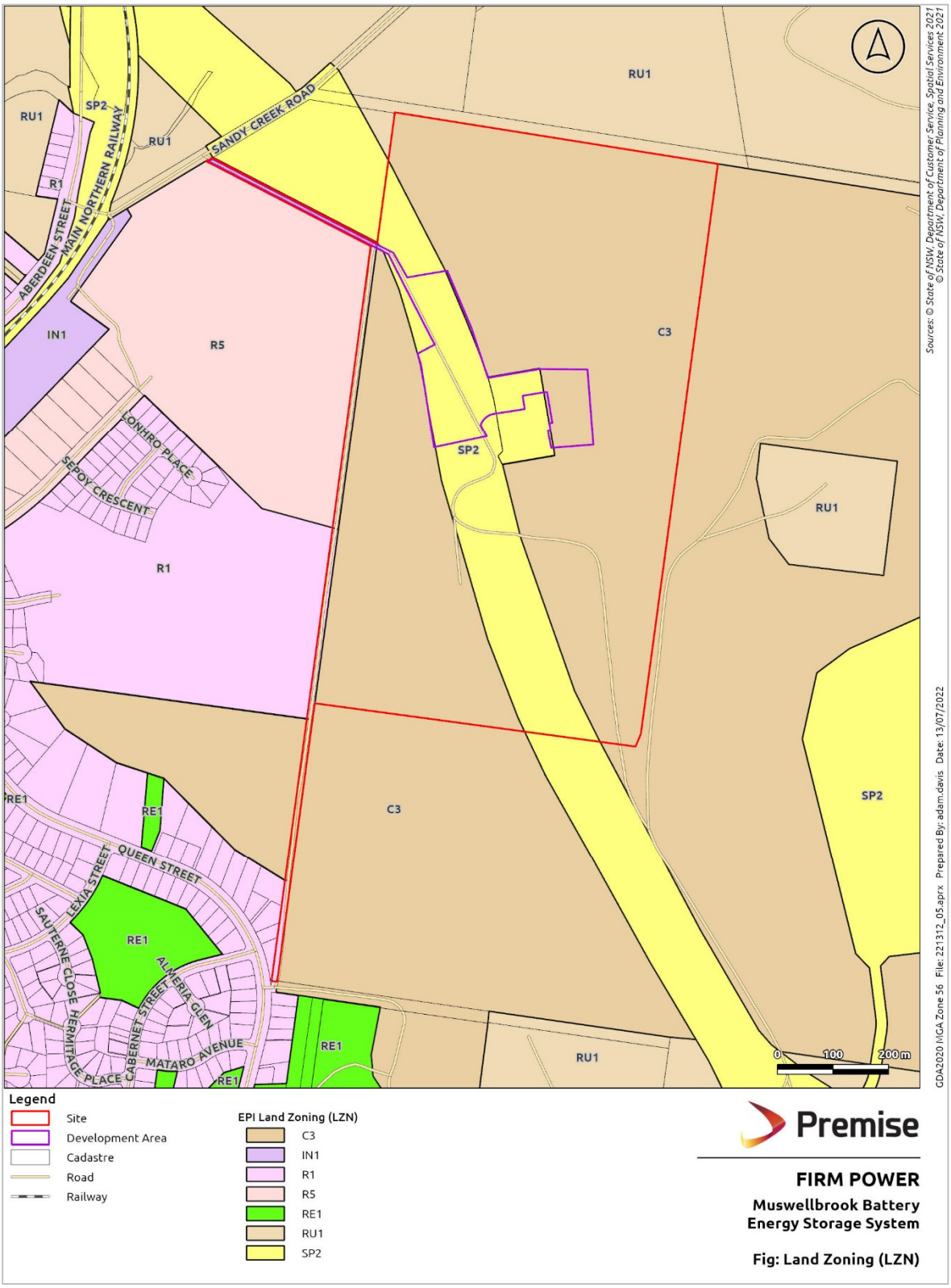


Source: OpenStreetMap

Land within the surrounding area is primarily zoned C3 – Environmental Management and RU1 – Primary Production and is occupied by agricultural use. Land west of the site is zoned R5 – Large Lot Residential and R1 – General Residential and is associated with residential land at the northern end of the Muswellbrook township.

Figure 3 shows the surrounding land use zoning. It also shows the development site within the red line boundary of the project site, which is predominantly zoned C3, with a portion being SP2.

Figure 3: Site and Surrounding Land Use



Source: Premise

2.2 Road Network

New England Highway is a State Road which runs in a northwest-southeast alignment from Newcastle to Muswellbrook, before running in a general northern alignment to its termination at the Queensland Border. Within the vicinity of the site, it has a typical sealed carriageway width of approximately 13 metres accommodating one lane of traffic in each direction and sealed shoulders on both sides of the road. It has a speed limit of 100km/hr which is reduced to 60km/hr within built up areas such as Muswellbrook, including at its intersection with Sandy Creek Road.

Sandy Creek Road is a municipal local road which extends northeast from New England Highway for approximately 15 kilometres to its termination. Within the vicinity of the site, it has a sealed carriageway width of approximately 9 metres which accommodates two-way traffic movement. It has a speed limit of 60km/hr which increase to 100km/hr further northeast of the site.

The intersection of New England Highway and Sandy Creek Road is priority controlled with vehicles exiting Sandy Creek Road provided with Give Way signage and linemarking. A right turn facility is provided on New England Highway to allow through vehicles to pass vehicles turning into Sandy Creek Road.

A railway level crossing is provided on Sandy Creek Road approximately 40 metres from the hold line at the intersection of New England Highway and Sandy Creek Road. The level crossing is provided with traffic signals. It is the Main Northern Line and is owned by ARTC.

An existing access driveway located on Crown reserve land, being Travelling Stock Reserve (TSR) 70196 (Lot 15 DP 905479), provides access to the site which extends from Sandy Creek Road. The road has a partially sealed carriageway with a width of approximately 4.0 metres. The existing access road is used by Ausgrid to access the existing Muswellbrook Substation

2.3 Traffic Volumes

Traffic volume data has been collected from the TfNSW Traffic Volume Viewer for New England Highway. A summary of the traffic volumes is provided within Table 1.

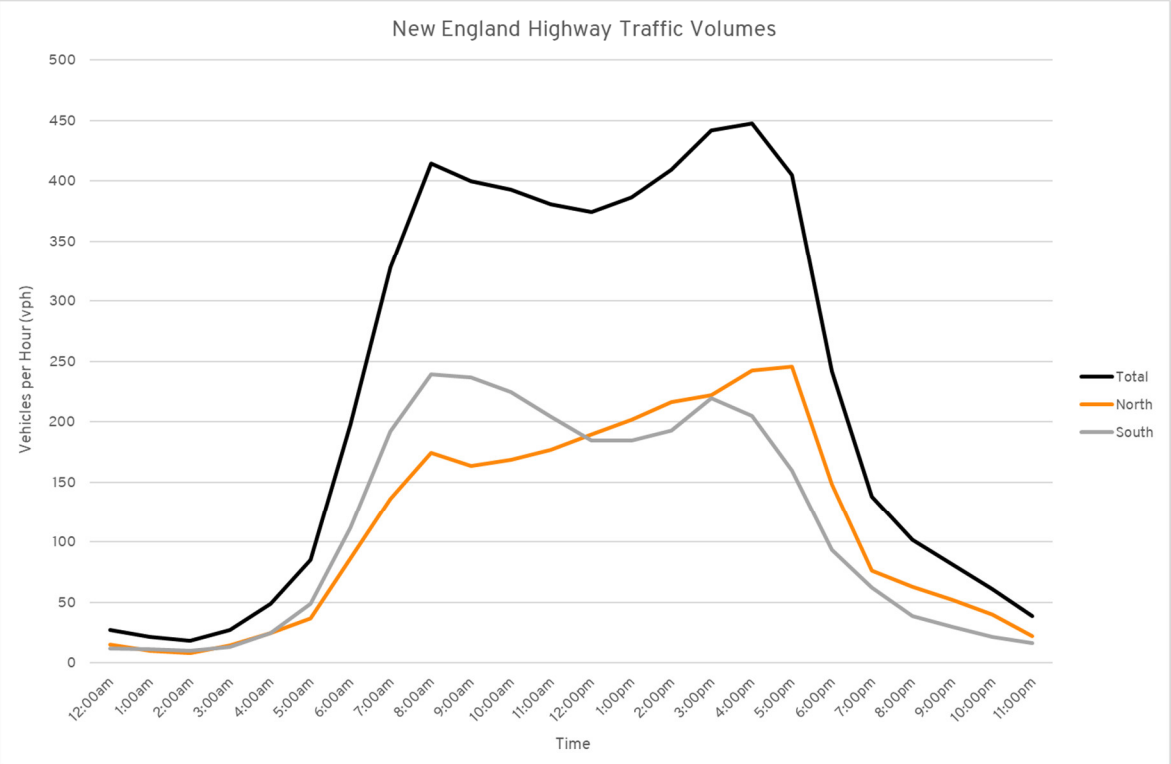
Table 1: New England Highway Traffic Volumes

Road	Survey Location	Station ID	Survey Year	Recorded Volume	Peak Hour Volumes
New England Highway	60 metres north of Burtons Lane	6157	2022	5,387 vpd 84% light 16% heavy	AM – 408 vph (8:00am) PM – 441 vph (4:00pm)

The traffic volumes for New England Highway have also been provided for each hour and separated into north and southbound movements. The traffic volumes are shown in Figure 4.

The TfNSW survey data indicates that New England Highway currently experiences most traffic movements between the hours of 7:00am and 6:00pm with a relatively flat-shaped distribution between the peak hours. Overall, the survey data suggests that New England Highway currently accommodates a moderate level of traffic.

Figure 4: New England Highway 2022 Traffic Volume Data



Traffic volume data has been provided by Muswellbrook Shire Council for Sandy Creek Road. The available data was recorded in 2010 and indicated the road carries in the order of 736 vehicle movements per day with 13% of the traffic movements being heavy vehicles. Applying a 1% growth factor the road is currently estimated to be accommodating in the order of 829 vehicle movements per day.

2.4 Public Transport Services

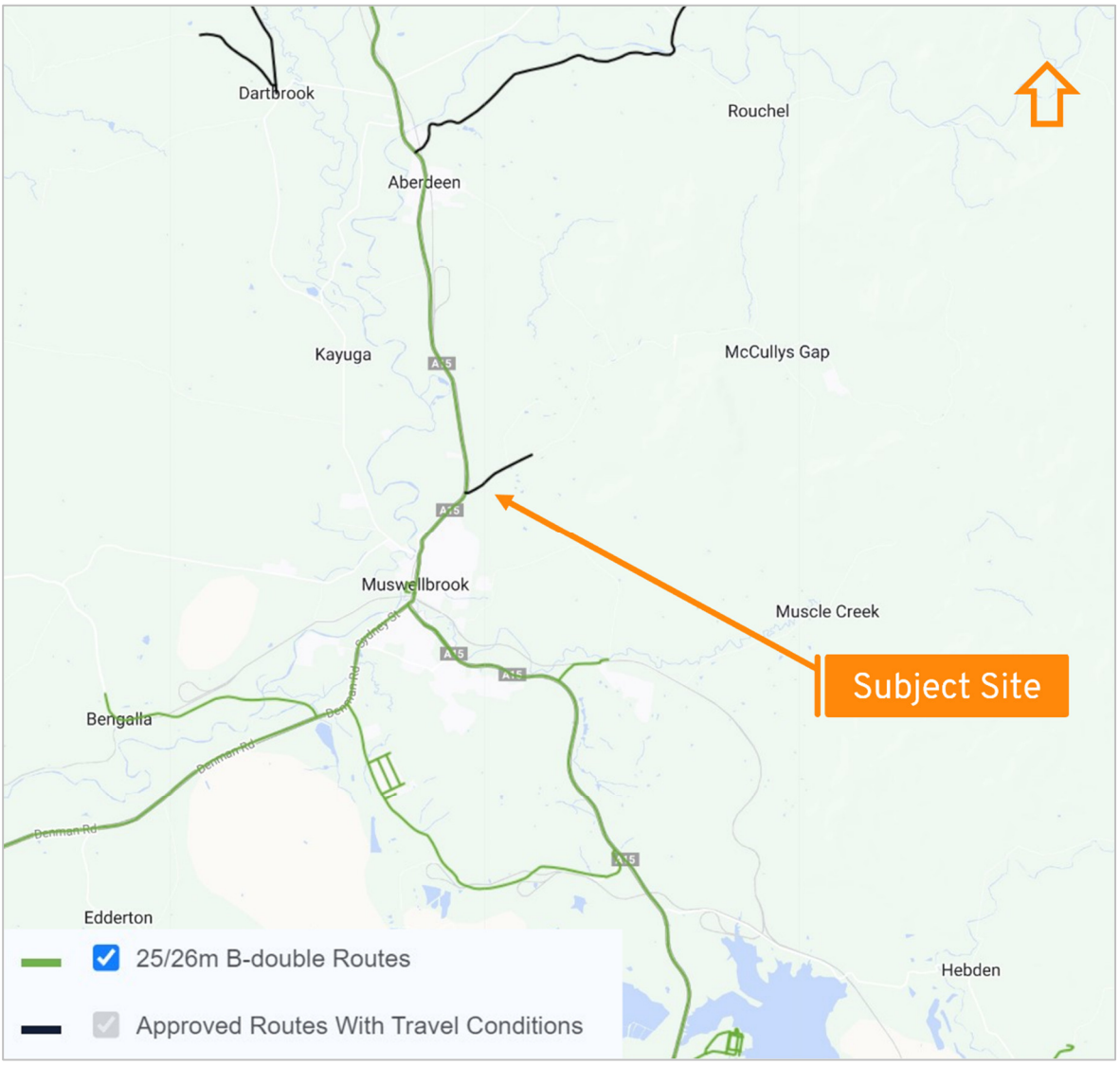
There are no public transport services which operate within the vicinity of the site. However, it is noted that a number of services are provided within the Muswellbrook township.

Osborn's Transport have advised that they operate a school bus service on Sandy Creek Road. The services travels along Sandy Creek Road in both directions during the morning and afternoon school period. Osborn's Transport have advised that the school bus is likely to be on Sandy Creek Road between 7:30am to 8:30am and from 4:00pm to 5:00pm.

2.5 Restricted Vehicle Access

The TfNSW Restricted Vehicle Access Map for the surrounding area is provided within Figure 5. The green lines indicate approved B-Double routes while the black lines represent approved routes with travel conditions. As can be seen from the figure, New England Highway is a B-Double route that feeds into the wider State road network and Sandy Creek Road is an approved route with travel conditions.

Figure 5: TfNSW Restricted Access Vehicle Map



Source: TfNSW Restricted Vehicle Access Map

2.6 Crash History

Amber has conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all injury crashes along within 500 metres of the intersection of New England Highway and Sandy Creek Road. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2016 to 2020.

The crash search recorded eight crashes which are summarised below:

- Two head on crashes were recorded on New England Highway resulting in one fatal and one serious injury crash;
- Two off road crashes on a bend were recorded resulting in moderate and serious injuries, with one of the crashes recorded on Sandy Creak Road and one on Queen Street;

- Three right rear crashes were recorded at the intersection of New England Highway and Sandy Creek Road resulting in moderate injuries, and one was recorded midblock on New England Highway.

Given the road classification and associated traffic volumes, it is concluded that the road network is currently operating in a relatively safe manner.

3. Traffic Assessment

3.1 Traffic Generation

3.1.1 Construction

The BESS construction is expected to take approximately 12 months, with the peak construction period expected to take 5 months. A maximum of 75 staff will be on-site during peak construction periods. Construction activities would be undertaken during standard daytime construction hours, as follows:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm
- No work on Sundays or public holidays.

Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities.

Construction traffic generated by the BESS can broadly be separated into the following three categories:

- Light vehicles associated with staff accessing the site, including shuttle buses that will be provided that can transport staff to/from the site reducing the need for private vehicle use;
- Medium and Heavy Rigid Trucks (MRV and HRV as defined within AS 2890.2:2018) will be used to deliver materials and smaller plant;
- Truck and Dog vehicles will be used to transport earthwork material to/from the site; and
- Articulated (AV as defined within AS 2890.2:2018) will be used to transport larger plant.

Approximately 5 Restricted Access Vehicles / oversized and overmass (OSOM) vehicles will be required for the delivery of larger plant to the site such as the substation transformer and are subject to separate permit applications and regulations. The impacts of the OSOM vehicles are discussed within Section 4 with the following assessment focusing on the impacts of the light and heavy vehicles which generate the bulk of the traffic and represent the typical traffic impact of the project on a day-to-day basis.

The construction traffic volumes for the project have been provided by the Applicant. It is anticipated that during peak construction the site could generate up to 60 heavy and 66 light vehicle movements per day. It is noted that a vehicle movement is classified as a vehicle travelling in one direction (i.e. a truck accessing the site would generate one movement towards the site and one movement away from the site when it departs).

Table 2 summarises the traffic movements generated during the construction period of the BESS.

Table 2: Traffic Generation During Construction

Vehicle Type	Average Vehicle Movements		Peak Vehicle Movements	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Vehicle (car / 4WD)	30	20	60	40
Shuttle Bus	2	1	6	3
MRV/HRV	4	1	12	2
Truck and Dog	16	2	40	4
19 metre AV	4	1	8	2
Total	**56**	**25**	**126**	**51**

Overall, the site is expected to generate approximately 51 vehicle movements during the morning and evening peak hours during the peak construction period, which will reduce to 25 vehicle movements over the typical construction periods.

3.1.2 Operational Traffic

During operation the BESS is expected to generate a minimal level of traffic associated with maintenance and operation services. The BESS is expected to be operated by up to 2 staff resulting in a traffic generation of up to 2 light vehicle movements per day and 1 heavy vehicle movement per month which would result in a negligible change to the traffic environment.

3.1.3 Decommissioning Traffic

At the end of the operational life of the project all above ground infrastructure will be dismantled and removed from the project site. Internal roads, excluding the existing access road used by Ausgrid to access the Muswellbrook substation, would be removed and the site reinstated to its existing state.

Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A comprehensive Construction Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

3.2 Traffic Distribution

Traffic accessing the site will do so via New England Highway and Sandy Creek Road and the existing site access point on Sandy Creek Road. Staff will primarily be located in Muswellbrook and the surrounding towns, with all plant expected to be delivered from Port of Newcastle. The following provides a breakdown of the anticipated access distribution for each of the vehicle classifications outlined within Table 2:

- Light Vehicles: It is anticipated that most staff will travel from Muswellbrook, with 90% of staff travelling from the south and 10% travelling from the north.
- MRV/HRV and Truck and Dog: These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area. The Applicant has advised that 95% will be travelling from the south and 5% travelling from the north.

- AV: Plant will be transported from Port of Newcastle to the site along New England Highway from the south.

The peak hour for construction will occur at the start and end of the day when staff are transported to/from the site. The majority of staff will typically arrive on-site between 6:00am and 7:00am. However, staff generally have staggered finish times which results in the evening peak hour being less pronounced. For the purposes of this assessment, it has been assumed that all staff depart between 5:30pm and 6:30pm and the evening peak traffic volumes is 80% of the morning peak volume.

During the morning peak all vehicle movements will be towards the site and in the evening peak all vehicle movements will be away from the site. Heavy vehicle movements will occur outside of peak times and school bus times, and will be distributed throughout the day and split evenly between inbound and outbound movements.

3.3 Traffic Assessment

Level of Service is a qualitative measure used to describe the operating conditions of a section of road or an intersection. Levels of Service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

The *RTA Guide to Traffic Generating Developments*, dated October 2002, suggests that ideally rural roads should not exceed service volumes at Level of Service C. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays are experienced. Table 4.5 of the RTA Guide sets out two-way hourly road capacities for two-lane roads for different levels of service with a design speed of 100 km/hr based on different terrain types.

The traffic volumes expected to be accommodated on the surrounding road network during the peak hour are shown within Table 3.

Table 3: Expected Peak Hour Traffic Volumes During Construction

Road	AM Peak (7:00am)			PM Peak (6:00pm)		
	Existing Volume	Expected Volume	LOS	Existing Volume	Expected Volume	LOS
New England Highway	323 vph	374 vph	A	238 vph	280 vph	A
Sandy Creek Road	83 vph	134 vph	A	83 vph	125 vph	A

Therefore, during the peak hours of the BESS construction New England Highway would accommodate approximately 374 vehicles per hour during peak construction, which is well within the capacity of the road network and the road is expected to continue to operate with a good level of service based on Table 4.5 of the RTA Guide.

During the middle of the day the traffic movements are expected to be predominantly associated with heavy vehicles with approximately 6-8 vehicle movements per hour. This increase in traffic would be within the daily variation of traffic volumes on New England Highway and can be readily accommodated on the road network.

During operation the increase in traffic of up to 2 vehicle movements per hour would result in a negligible change to the traffic environment.

Accordingly, the road network is able to readily accommodate the traffic generated by the development during the construction and operational periods.

3.4 Cumulative Traffic Impacts

The primary traffic impact of the BESS is generated during construction which is anticipated to start late 2023 and be completed late 2024. The assessment outlined earlier demonstrates that the road network will continue to operate with ample spare capacity even during the peak construction period of the BESS.

The Muswellbrook Bypass is proposed to be constructed adjacent to the site by TfNSW who have advised that the project is expected to start construction in late 2023 and occur for approximately 3.5 years. As such, the construction periods of the two projects are expected to overlap. TfNSW has advised that at this stage no further assessment is required for the cumulative traffic impacts of the two projects but that the future Construction Traffic Management Plan should be prepared in consultation with the Delivery Project Manager for the bypass project (refer attached correspondence in Appendix B).

A review has been undertaken for the major projects within the vicinity of the site which indicates there is the potential for a number of projects to overlap, particularly from other renewable projects. The surrounding major projects have the potential to generate a number of staff vehicle movements within Muswellbrook and along New England Highway during the peak periods associated with construction. In particular, it is recommended that any future OSOM vehicle movements consider the potential for other similar movements generated by the nearby renewable projects.

The traffic assessment provided within this report demonstrates that the road network is expected to continue to operate with a good level of service with ample spare capacity. As such, the combined increase in traffic generated by the site and these projects is expected to have a minimal cumulative impact on the road network, including through Muswellbrook. Further, it is noted that the peak traffic generated by these projects during construction occurs before 7:00am and after 6:00pm which is outside of the peak times of the road network.

Accordingly, the combined increase in traffic generated by the site and these projects is expected to have a minimal cumulative impact on the road network in the surrounding area.

4. Route Assessment

4.1 Access Route

The Port of Newcastle has been identified as the preferred port where the BESS plant will be imported. The proposed construction traffic access route from the Port of Newcastle to the site is as follows:

- Selwyn Street,
- George Street,
- Industrial Drive,
- Maitland Road,
- New England Highway,
- John Renshaw Drive,
- Hunter Expressway,
- New England Highway, and
- Sandy Creek Road.

A map showing the indicative access route is shown within Appendix C.

The access route to the site from the State road network (new England Highway) is shown within Figure 6. The access route utilises roads that are designated for B-Double vehicles as outlined within the TfNSW Restricted Access Vehicle Map excluding Sandy Creek Road. Accordingly, the State roads along the access route are able to accommodate the loads and type of vehicle movement to be generated during construction of the BESS.

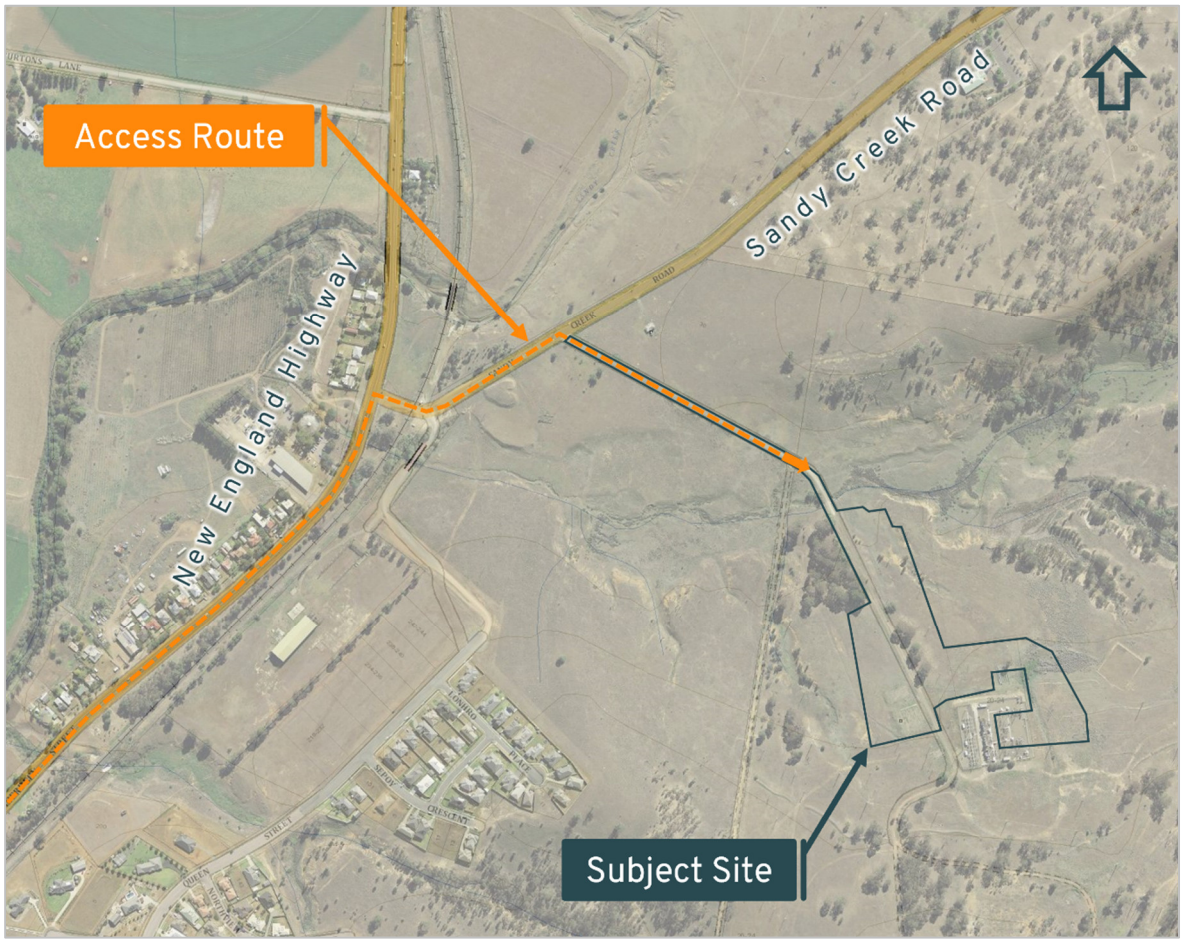
Sandy Creek Road is an approved route with travel conditions. It has a width of approximately 9 metres which is sufficient to accommodate simultaneous two-way vehicle movement. Accordingly, it is considered appropriately designed to accommodate the traffic volumes to be generated by the site.

A railway level crossing is provided along Sandy Creek Road. The level crossing is rated to accommodate AVs and as such are suitable to accommodate the development traffic. The asset is owned by ARTC who have requested that additional consultation be undertaken closer to construction (refer correspondence provided within Appendix D).

4.2 Access Driveway

Access to the site is proposed via an existing access driveway located on Crown reserve which is provided with a partially sealed carriageway. The driveway is proposed to continue to operate with one lane which is considered acceptable given all vehicle movements in the peak hour are towards the site in the morning peak and away from the site in the evening peak. Further, truck movements through the day are able to be managed on-site to ensure two trucks don't meet along the road.

Figure 6: Access Route from State Road



Source: Six Maps

4.3 Mitigation Measures

A Construction Traffic Management Plan (CTMP) will be prepared prior to construction of the site. It is recommended that the following form part of the CTMP to minimise the impact of construction traffic:

- Prior to construction, a pre-condition survey of the driveway and section of Sandy Creek Road between the driveway and New England Highway be undertaken, in consultation with Council. During construction the sections of the road network utilised by the proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the BESS would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in the consistent condition as at the start of construction.
- Neighbours of the BESS be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.

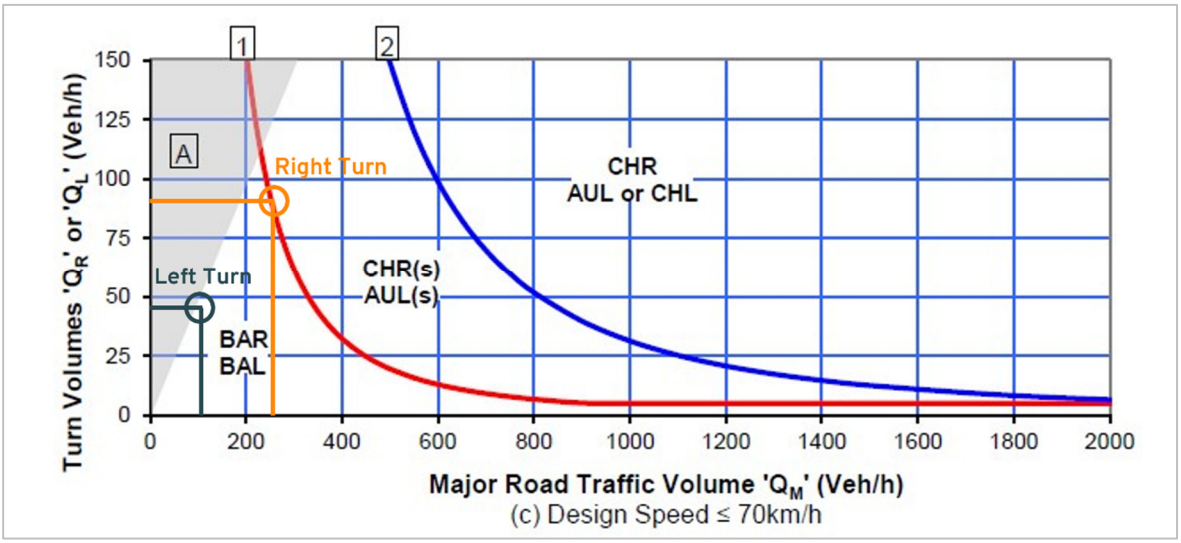
Therefore, it is concluded that the surface of the roads are suitable to accommodate the future traffic volumes.

5. Intersection Assessment

5.1 Turn Treatments

Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings specifies the turning treatments required at intersections. Figure 3.25 of the guide specifies the required turn treatments on the major road at unsignalised intersections and is provided below in Figure 7.

Figure 7: Figure 3.25 of Austroads Guide to Traffic Management Part 6



During construction of the BESS additional vehicle movements will be generated at the intersection of New England Highway and Sandy Creek Road. The requirement to provide turn facilities is primarily generated during the morning peak hour when staff access the site which occurs from 6:00am to 7:00am. Table 4 identifies the required turning treatments based on the expected traffic volumes at the intersection.

Table 4: Turning Volumes for Turn Treatment Calculations

Turning Treatment	Traffic Volume (vph)		Requirement
	Turn Volume	Major Road	
Right Turn	89	241	CHR(s)
Left Turn	46	110	BAL

Therefore, the intersection would require a Basic Left Turn (BAL) and a Channelised Right Turn (CHR) treatment. These turn facilities are already provided at the intersection although it is noted that the right turn treatment is based on an old design standard. Given the increase in traffic movements is temporary it is considered that the existing turn treatments are suitable to allow vehicles to turn safely from the New England Highway.

In order to confirm Sandy Creek Road can be accessed by AVs a swept path assessment has been provided within Appendix A using the Autodesk Vehicle Tracking software. The assessment demonstrates that the vehicle is able to suitable turn to/from New England Highway.

5.2 Sight Distance

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections specifies the Safe Intersection Sight Distance (SISD) as the minimum sight distance which should be provided along the major road at any intersection. Table 3.1 of the guide specifies the SISD required for various design speeds. Given New England Highway and Sandy Creek Road have a speed limit of 60km/hr a design speed of 70km/hr has been adopted which requires an SISD of 151 metres.

The available sight distance at the intersection is approximately 185 metres to the south and 215 metres to the north and exceeds the requirements of the Austroads Guide given the relatively flat and straight alignment of the road network. Accordingly, vehicles are expected to be able to safely enter the State road network.

5.3 Site Access

A swept path assessment has been prepared for the intersection of Sandy Creek Road and the access driveway and is provided within Appendix A. The swept path assessment shows the intersection is able to accommodate AVs. It is noted that the vehicle crosses the centreline of Sandy Creek Road which is considered acceptable given the limited number of larger vehicles expected to access the driveway and the temporary nature of the construction stage of the project when these movements are generated.

The available sight distance at the intersection is 235 metres to the north and 214 metres to the south. The sight distance exceeds the Austroads requirement of 151 metres based on an 85th percentile speed of 70km/hr.

Accordingly, the site access is concluded to be suitably designed for the vehicles expected to access the site.

6. Construction Management Plan

A Construction Traffic Management Plan (CTMP) will be prepared prior to construction commencing by the appointed contractor. The CTMP will provide additional information regarding the traffic volumes and distribution of construction vehicles that is not available at this time, including:

- Road transport volumes, distribution and vehicle types broken down into:
  - Hours and days of construction.
  - Schedule for phasing/staging of the project.
- The origin, destination and routes for:
  - Employee and contractor light traffic.
  - Heavy vehicle traffic.
  - Oversize and overmass traffic.

The following provides recommended measures that should be adopted within the CTMP to minimise the impact of construction traffic along the road network:

- Neighbours of the BESS be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.
- It is recommend that deliveries by larger trucks avoid times when school buses are expected on Sandy Creek Road (7:30am to 8:30am and from 4:00pm to 5:00pm).
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time.
- All vehicles will enter and exit the site in a forward direction.
- Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. The following code is to be implemented as a measure to maintain safety within the site:
  - Utilisation of only the designated transport routes.
  - Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
- Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas.
- All permits for working within the road reserve must be received from the relevant authority prior to works commencing.
- A map of the primary haulage routes highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.
- A complaint resolution and disciplinary procedure.
- Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather).

The above recommendations will ensure the construction traffic will create a minimal impact to the capacity and safety of the surrounding road network.

It is also recommended that the CTMP be prepared following further consultation with TfNSW to confirm the proposed construction traffic with the Delivery Project Manager for the Muswellbrook Bypass Project. Any vehicle movements larger than an AV will require consultation with ARTC in relation to the use of the railway level crossing.

7. Conclusion

Amber Organisation has assessed the traffic impacts of the 150MW BESS located approximately 2.5km northeast of Muswellbrook. Access to the site is proposed via an existing access driveway, and connects to New England Highway via Sandy Creek Road. Staff are expected to primarily be located in Muswellbrook, with all plant expected to be delivered from Port of Newcastle. The above assessment determined the following:

- The site 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 road network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages. Further, the cumulative impact of the site traffic with nearby developments is expected to be minimal;
- The proposed construction traffic access route is designated for B-Double vehicles and as such, the access route is able to accommodate the loads and type of vehicle movements to be generated during construction of the BESS;
- It is noted that approximately 5 oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment during construction;
- The intersection of New England Highway and Sandy Creek Road is provided with suitable turn treatments and adequate sight distance to allow vehicles to safely enter and exit the State road network; and
- In order to mitigate the impacts of the development during construction a CTMP will be prepared which should include the recommendations provided within this document.

Accordingly, based on the assessment above, it is concluded that the proposed access arrangements for the BESS are suitable to accommodate the expected construction vehicle types and traffic volumes during the construction and operation phase of the project.

Appendix A

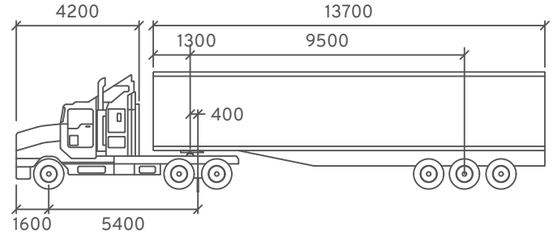
Swept Path Assessment

Vehicle Envelope

300mm Clearance

Reverse Manoevure

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	70.0

Battery Energy Storage System

20 Sandy Creek Road, Muswellbrook

Swept Path Assessment

DRAWN: MW
DATE: 13/07/2022
DWG NO: 373-S01D
SCALE at A3: 1:400m

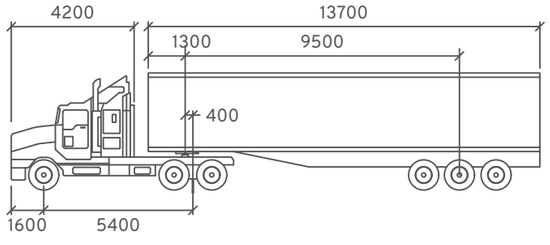
Amber 01

Vehicle Envelope

300mm Clearance

Reverse Manoevure

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	70.0

Battery Energy Storage System

20 Sandy Creek Road, Muswellbrook

Swept Path Assessment

DRAWN: MW
DATE: 13/07/2022
DWG NO: 373-S01D
SCALE at A3: 1:400m

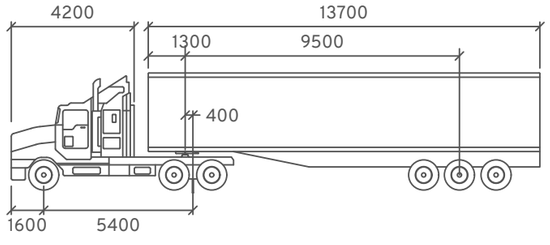
Amber 02

Vehicle Envelope

300mm Clearance

Reverse Manoevure

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	70.0

Battery Energy Storage System

20 Sandy Creek Road, Muswellbrook

Swept Path Assessment

DRAWN: MW
DATE: 13/07/2022
DWG NO: 373-S01D
SCALE at A3: 1:400m

Amber 03

Appendix B

TfNSW Correspondence

Mike Willson

From: Holly Taylor <Holly.Taylor2@transport.nsw.gov.au>
Sent: Wednesday, 22 June 2022 11:24 AM
To: Mike Willson
Subject: RE: Muswellbrook BESS Project - Traffic Assessment

Hi Mike,

I would suggest noting that there may be a crossover of the bypass and BESS projects as part of the TIA. TfNSW can then monitor the timing of both projects and recommend requirements for the TMP to be considered at construction phase if neccessary.

Holly Taylor
Development Services Support Officer
Regional and Outer Metropolitan Division
Development Services

T (02) 4908 7688 **M** 0499 313 670 **E** holly.taylor2@transport.nsw.gov.au

transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
Locked Bag 2030, Newcastle NSW 2302

Working days Monday to Friday, 8:00am – 3:30pm

Transport for NSW

I acknowledge the Aboriginal people of the country on which I work, their traditions, culture and a shared history and identity. I also pay my respects to Elders past and present and recognise the continued connection to country.

Please consider the environment before printing this email.

From: Mike Willson <mike@amberorg.com.au>
Sent: Tuesday, 21 June 2022 1:20 PM
To: Holly Taylor <Holly.Taylor2@transport.nsw.gov.au>
Subject: RE: Muswellbrook BESS Project - Traffic Assessment

Thanks Holy, I appreciate you getting back to me so quickly.

From my reading of the information below it sounds like there will be crossover of the construction of the bypass and BESS as expected. I assume that this will just need to be considered closer to the time when the CTMP for the BESS is submitted? Is there any specific comment you want us to make in our report other than noting there will be crossover of construction?

I have sent an email to ARTC to get their feedback.

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

Amber

From: Holly Taylor <Holly.Taylor2@transport.nsw.gov.au>
Sent: Tuesday, 21 June 2022 12:09 PM
To: Mike Willson <mike@amberorg.com.au>
Subject: RE: Muswellbrook BESS Project - Traffic Assessment

Hi Mike,

Thank you for reaching out to TfNSW to discuss the Muswellbrook Battery Energy Storage System proposal.

Following internal discussions with the Delivery Project managers for Muswellbrook bypass project, I wish to advise as follows:

- Construction for the Muswellbrook bypass is planned to start late 2022 with enabling works and main works following in late 2023. The main construction is expected to take about 3 and a half years to complete.
- The BESS project has noted construction is expected to take approximately 12 months commencing late 2023, with the peak construction period expected to take 5 months. A maximum of 50 staff will be on-site during peak construction periods with construction is expected to start in late 2023. Based on the information it is likely that the construction periods will overlap.
- At this stage access to construct the northern connection is planned via Sandy Creek Road including the use of a compound site within Transport land adjacent to the BESS proposal.

Reference is also made to your comments regarding construction vehicle movements and it is noted that swept paths prepared for the largest design vehicle will be provided.

It is recommended that the proponent consults with Australian Rail Track Corporation (ARTC) and undertakes an assessment of the holding capacity of the intersection when the level crossing is in use to determine if the intersection is suitable for the forecast construction traffic volumes as a result of the BESS proposal.

Holly Taylor
Development Services Support Officer
Regional and Outer Metropolitan Division
Development Services

T (02) 4908 7688 **M** 0499 313 670 **E** holly.taylor2@transport.nsw.gov.au

transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
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Transport for NSW

I acknowledge the Aboriginal people of the country on which I work, their traditions, culture and a shared history and identity. I also pay my respects to Elders past and present and recognise the continued connection to country.

Please consider the environment before printing this email.

From: Holly Taylor <Holly.Taylor2@transport.nsw.gov.au>
Sent: Tuesday, 14 June 2022 2:57 PM
To: Development North <Development.North@transport.nsw.gov.au>
Subject: FW: Muswellbrook BESS Project - Traffic Assessment

From: Mike Willson <mike@amberorg.com.au>
Sent: Monday, 13 June 2022 11:00 AM
To: Holly Taylor <Holly.Taylor2@transport.nsw.gov.au>
Subject: Muswellbrook BESS Project - Traffic Assessment

Hi Holy,

Thanks for your time on the phone last week. As discussed, we have been engaged as the traffic engineers for the Muswellbrook Battery Energy Storage System project.

The BESS is proposed to have a capacity of 150MW and is located at 20-24 Sandy Creek Road, Muswellbrook. Access to the site is proposed via an existing unnamed Council road that connects to the State road network via Sandy Creek Road and New England Highway. Staff are expected to primarily be located in Muswellbrook, with all plant expected to be delivered from Port of Newcastle.

The BESS construction is expected to take approximately 12 months, with the peak construction period expected to take 5 months. A maximum of 50 staff will be on-site during peak construction periods. The following table summarises the expected traffic generation during construction which is expected to start in late 2023.

Table 2: Traffic Generation During Construction

Vehicle Type	Average Vehicle Movements		Peak Vehicle Movements	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)

Light Vehicle (car / 4WD)	30	20	60	40
Shuttle Bus	2	1	6	3
MRV/HRV	4	1	12	2
Truck and Dog	16	2	40	4
AV/B-Double	4	1	8	2
Total	**56**	**25**	**126**	**51**

I understand the Muswellbook Bypass is proposed adjacent to the site so it would be good to get some feedback on the potential crossover of construction traffic. During operation the site is expected to generate in the order of 2 vehicle movements per day so the construction period is the key time when the site will generate vehicle movements on the road network.

The intersection of New England Highway and Sandy Creek Road is currently provided with a right turn facility and no left turn facility. The majority of construction vehicle movements will be turning right into Sandy Creek Road so at this stage we aren't proposing any additional turn treatments but would be happy to hear feedback on this matter. I note we will be preparing swept paths to show suitable vehicle movement by larger trucks at the intersection.

Your feedback on the above would be appreciated. If you have any queries please feel free to contact me.

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

Amber

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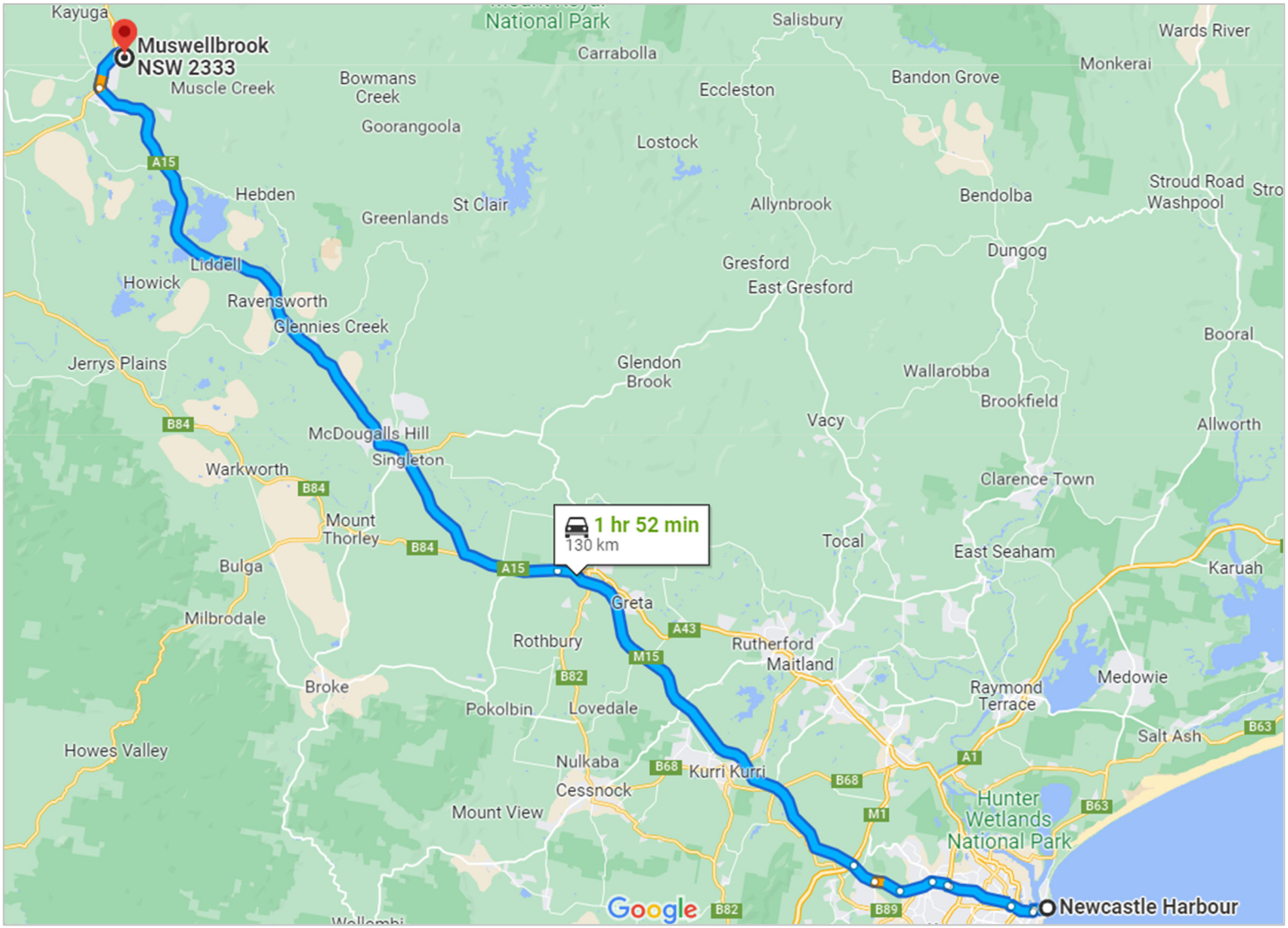
Appendix C

Indicative Access Route

Figure 8: Indicative Access Route from Port to Site



Source: Google Maps

Appendix D

ARTC Correspondence

Mike Willson

From: Mark Robinson <MRobinson@ARTC.com.au>
Sent: Wednesday, 22 June 2022 4:35 PM
To: Mike Willson
Cc: John Brown; HV Property Services
Subject: RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Mike,

At this stage there is no further actions

Your planning approval should trigger off formal consultation with ARTC behalf of TFNSW being the land owner.
Any vehicles over a Semi Trailer will need to follow ARTC ODL process when the time comes.

Hope this satisfies your enquiry

Regards

Mark Robinson
External Works Manager
Hunter Valley & Central North West

ARTC

P.
M. 0448870613
E. MRobinson@ARTC.com.au

Australian Rail Track Corporation
6 Kings Road
Broadmeadow NSW 2292

artc.com.au

From: Mike Willson <mike@amberorg.com.au>
Sent: Wednesday, 22 June 2022 11:54
To: Mark Robinson <MRobinson@ARTC.com.au>
Cc: John Brown <JBrown@artc.com.au>; HV Property Services <HVPropertyServices@ARTC.com.au>
Subject: [EXT] RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Hi Mark,

Do you think the risk assessment should be undertaken at the time of us preparing the Traffic Impact Assessment for the development application or is this something that is normally prepared as part of the Construction Traffic Management Plan when the actual truck sizes and movements are better known?

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

From: Mark Robinson <MRobinson@ARTC.com.au>
Sent: Wednesday, 22 June 2022 10:21 AM
To: Mike Willson <mike@amberorg.com.au>
Cc: John Brown <JBrown@artc.com.au>; HV Property Services <HVPropertyServices@ARTC.com.au>
Subject: RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Mike,

If we think the risk is there is purely a case us both co-ordinating the date and we would organise the key stakeholder to attend and follow SFAIRP Risk assessment, and we can review and raise any potential risks.

It maybe a case that project keeps in touch with any changes or proposals that may impact the crossing at this stage And direct the enquiry's directed to ARTC Property - HVPropertyServices@ARTC.com.au

Happy to talk through any enquiry's , it just in the absence you cant get myself or John it will still allow someone to respond.

Regards

Mark Robinson
External Works Manager
Hunter Valley & Central North West

P.
M. 0448870613
E. MRobinson@ARTC.com.au

Australian Rail Track Corporation
6 Kings Road
Broadmeadow NSW 2292

artc.com.au

From: Mike Willson <mike@amberorg.com.au>
Sent: Wednesday, 22 June 2022 09:55
To: Mark Robinson <MRobinson@ARTC.com.au>
Cc: John Brown <JBrown@artc.com.au>
Subject: [EXT] RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Hi Mark,

Based on your comments we can check with the Applicant and see if they are happy to just have AV vehicles accessing the site.

If a risk assessment is required can you advise how we get this arranged and any further information you need?

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

From: Mark Robinson <MRobinson@ARTC.com.au>
Sent: Wednesday, 22 June 2022 9:31 AM
To: Mike Willson <mike@amberorg.com.au>
Cc: John Brown <JBrown@artc.com.au>
Subject: RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Hi Mike,

Something else to beware based on our records this crossing only rated for Semi Trailer so if you're planning to take B Double or none standard plant over like graders etc.
The project will need to consult with us so we can ensure the project doesn't endanger themselves or the rail users.

We would recommend that a risk assessment maybe needed to inform your project safety paperwork and inductions in relation to the level crossing, due to the volume of the traffic and drivers behaviours that this project will introduce.

Regards

Mark Robinson
External Works Manager

Hunter Valley & Central North West

ARTC

P.
M. 0448870613
E. MRobinson@ARTC.com.au

Australian Rail Track Corporation
6 Kings Road
Broadmeadow NSW 2292

artc.com.au

From: Mike Willson <mike@amberorg.com.au>
Sent: Wednesday, 22 June 2022 08:46
To: Mark Robinson <MRobinson@ARTC.com.au>
Cc: John Brown <JBrown@artc.com.au>; HV Property Services <HVPropertyServices@ARTC.com.au>
Subject: [EXT] RE: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Morning Mark,

Thanks for getting back to me so quickly.

The traffic information and type of vehicles were all provided in the email that was attached. I have provided it again below.

The BESS is proposed to have a capacity of 150MW and is located at 20-24 Sandy Creek Road, Muswellbrook. Access to the site is proposed via an existing unnamed Council road that connects to the State road network via Sandy Creek Road and New England Highway. Staff are expected to primarily be located in Muswellbrook, with all plant expected to be delivered from Port of Newcastle.

The BESS construction is expected to take approximately 12 months, with the peak construction period expected to take 5 months. A maximum of 50 staff will be on-site during peak construction periods. The following table summarises the expected traffic generation during construction which is expected to start in late 2023.

Table 2: Traffic Generation During Construction

Vehicle Type	*Average Vehicle Movements*		*Peak Vehicle Movements*	
	Daily (vpd)	*Peak Hour (vph)*	*Daily (vpd)*	*Peak Hour (vph)*
Light Vehicle (car / 4WD)	*30*	*20*	*60*	*40*
Shuttle Bus	*2*	*1*	*6*	*3*

MRV/HRV	*4*	*1*	*12*	*2*
Truck and Dog	*16*	*2*	*40*	*4*
AV/B-Double	*4*	*1*	*8*	*2*
Total	***56***	***25***	***126***	***51***

The intersection of New England Highway and Sandy Creek Road is currently provided with a right turn facility and no left turn facility. The majority of construction vehicle movements will be turning right into Sandy Creek Road so at this stage we aren't proposing any additional turn treatments.

All we are really proposing is an increase in traffic movements over the level crossing during construction. During operation the site is expected to only generate in the order of 4 light vehicle movements per day.

No traffic control measures are proposed near the level crossing and no work is proposed within the land associated with the railway line.

A CTMP will be prepared for the site at a later stage once the development is approved. We would be happy to provide recommendations within our traffic report to be included in the CTMP if you have anything specific you would like to add.

I'll make a note in our report regarding the train movements you have indicated below.

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

From: Mark Robinson <MRobinson@ARTC.com.au>
Sent: Wednesday, 22 June 2022 8:39 AM
To: Mike Willson <mike@amberorg.com.au>
Cc: John Brown <JBrown@artc.com.au>; HV Property Services <HVPropertyServices@ARTC.com.au>
Subject: Muswellbrook BESS Project - Traffic Assessment - Sandy Creek

Hi Mike,

Yes this level crossing is managed by ARTC.

Are you able provide and understanding of the quantity and type of vehicles that will be passing over this crossing.
We would also need to have a review of the TMP proposed for the level crossing to ensure that it doesn't impact the safety controls at the crossing.

Please note majority of the trains passing through this line are *not time tabled* and range from 20-30 trains a day.

Additionally if the project requires to work within the ARTC Lease footprint ARTC Property consent will be required.

If you can response to JBrown@artc.com.au he will be able the help further with your enquiry

Regards

Mark Robinson
External Works Manager
Hunter Valley & Central North West

ARTC

P.
M. 0448870613
E. MRobinson@ARTC.com.au

Australian Rail Track Corporation
6 Kings Road
Broadmeadow NSW 2292

artc.com.au

8217 4366. While we have taken various steps to alert us to the presence of computer viruses we do not guarantee that this communication is virus free.

From: Mike Willson <mike@amberorg.com.au>
Sent: Tuesday, 21 June 2022 1:18 PM
To: Development <Development@ARTC.com.au>
Subject: [EXT] Muswellbrook BESS Project - Traffic Assessment

---

Hi,

We have been engaged as the traffic engineers for the Muswellbrook Battery Energy Storage System project. During construction the site is expected to generate a number of vehicle movements at the railway level crossing on Sandy Creek Road.

Please refer to the attached email which provides background information on the project and current comments from TfNSW.

Can you please confirm if you have any comments on the project and the operation of the railway level crossing. We understand from TfNSW that you are the owner of the asset.

Kind Regards

Mike Willson
BE (Hons) CPEng RPEQ
Director

Ph: +61 432 022 363

Amber