Appendix D

Traffic Assessment

AGL Future Land Use and Enabling Works

Traffic Assessment

AGL Macquarie Pty Ltd

4 April 2024

The Power of Commitment

Project name		AGL Planning Proposal – Bayswater and Liddell Power Station					
Document title		AGL Future Land Use and Enabling Works | Traffic Assessment					
Project number		12624330					
File name		12624330-REP_Broader Employment Transition Area Planning Proposal Report_ Appendix D_Rev 1.docx624330-REP_Bayswater and Liddell Power Stations_TIA.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	J Yoo / M Lucas	C Steinbach	Christophe Steinbach	S Lawer		05/04/24

GHD Pty Ltd ABN: 39 008 488 373
Level 15, 133 Castlereagh Street
Sydney, NSW 2000, Australia
T +61 2 9239 7100 **| F** +61 9239 7199 **| E** sydmail@ghd.com **| ghd.com**

[Compliance statement]

→ The Power of Commitment

Contents

Table index

Figure index

Terms and abbreviations

Abbreviation	Description
AGL	AGL Pty Ltd
AGLM	AGL Macquarie Pty Limited
AGTM	Austroads Guide to Traffic Management
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
BAW	Bayswater Ancillary Works
BPS	Bayswater Power Station
CSSI	Critical State Significant Infrastructure
DPE	Department of Planning & Environment
DoS	Degree of Saturation
EIS	Environmental Impact Statement
EP&A	Environmental Planning and Assessment
GHD	GHD Pty Ltd
h	Hour
HV	Heavy vehicle
km	Kilometres
LAD	Liddell Ash Dam
LGA	Local Government Area
LOS	Level of Service
LPS	Liddell Power Station
LV	Light vehicle
ln	Lane
m	Metres
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
OSOM	Oversize Overmass
pc	Passenger car units
Rehabilitation	Includes recontouring of landforms and revegetation, and excludes all remediation
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SEARs	Secretary's environmental assessment requirements
SSD	State Significant Development
tcu	Through car units
TfNSW	Transport for New South Wales
TIA	Transport Impact Assessment
VCR	Volume Capacity Ratio
vpd	Vehicles per day
vph	Vehicles per hour
WIRES	Wildlife Information and Education Service

1. Introduction

1.1 Project background and overview

AGL Macquarie Pty Ltd (AGL) has engaged GHD Pty Ltd (GHD) to prepare an initial Planning Proposal (the Proposal). The Proposal seeks an amendment to *Muswellbrook Local Environmental Plan 2009* (the LEP) to permit compatible additional uses at the Bayswater and Liddell Power Station sites (the site).

AGL Macquarie Pty Ltd (AGL) owns the operating Bayswater Power Station (BPS) and the adjoining former Liddell Power Station (LPS) site. In line with the commitments in its Climate Transition Action Plan released in 2022, AGL ceased to operate LPS in April 2023 and has committed to close BPS by no later than 2033.

Once both the LPS and BPS closures occur, when structures are demolished and the site rehabilitated, AGL are committed to redeveloping the site into an integrated industrial Energy Hub. The proposed changes to the LEP will aim to provide a flexible approach to future development on the site in the short, medium, and long term to allow for a range of land uses to occur in accordance with state and local government expectations. Allowing the transition to commence prior to the closure of BPS, and as the LPS is rehabilitated, will reduce shocks to the social and economic conditions in the Upper Hunter.

The Hunter Regional Plan 2041 identifies the land owned by AGL as an opportunity to co-locate other employment generating activities on the Liddell and Bayswater site to establish an integrated industrial Energy Hub. The Liddell Future Land Use and Enabling Works Reporting prepared by GHD has also identified future opportunities within this overall locality. The availability of rail, highway access, and infrastructure offer developers an alternative site outside of existing urban areas.

AGL are currently working with Muswellbrook Shire Council (Council) and the Department of Planning and Environment (DPE) to investigate how this outcome can be delivered through place-based planning. The Regional Plan 2041 has suggested a number of employment generating land uses including manufacturing, waste, freight, hydrogen, data and agribusiness. Due to the nature of the site, industrial related uses are considered compatible with the existing character of the locality.

1.2 Purpose of this report

GHD was engaged by AGL to prepare a Traffic Assessment (TA) to support the preparation of the Proposal. The TA will identify the capacity and road network performance of existing traffic conditions and available capacity to facilitate development envisaged by the amendment of the LEP for an integrated industrial Energy Hub (Energy Hub). This report will:

- Describe the existing environment with respect to the project.
- Assess the capacity of the road network to accommodate the expected trip generation of the Energy Hub.
- Determine the potential size of the Energy Hub in accordance with the capacity of the adjoining road networks in accordance with Transport for NSW (TfNSW) trip generation rates.

1.3 Site details

AGL owns the expanse of land surrounding the BPS and LPS sites, as indicated in Figure 1.1. Local land use in proximity to the site predominantly consists of large-scale industrial infrastructure associated with both the Liddell and Bayswater power stations, as well as open cut mining activities at Ravensworth, Mount Arthur, Hunter Valley Operations, Liddell Coal Mine and the Maxwell project. Agricultural clearing for the purposes of grazing has also occurred within and surrounding the broader AGL landholding.

The site is located across two Local Government boundaries, being the Muswellbrook and Singleton LGAs. The site is surrounded by rural lands and is divided by the New England Highway. The closest social infrastructure development

and residential sensitive receiver is the Lake Liddell Recreation Area and the Lake Liddell Recreation Area's owner's residence, which is located approximately two kilometres north of the Liddell Core Investigation Area.

Figure 1.1 Area locality

Three specific sites have been identified to accommodate the land uses associated with Energy Hub, as displayed in Figure 1.2.

Figure 1.2 Energy Hub sites

As displayed in Figure 1.2:

– Site 1 and Site 2 are located on the western side of the New England Highway
– Site 3 is located on the eastern side of the New England Highway

1.4 Report structure

The report is structured as follows:

- Section 1 – provides an introduction to the Proposal.
- Section 2 – describes the legislative and policy context.
- Section 3 – describes the existing condition.
- Section 4 – provides a project description and assesses the capacity of the road network to accommodate vehicle activity associated with the Energy Hub (based on publicly available data).
- Section 5 – conclusion.

1.5 Study assumptions

The preparation of this assessment has relied on the following data sources and assumptions:

- Available traffic data for the intersections of interest has been sourced from the Transport Impact Assessment for Liddell Future Land Use and Enabling Works Project (the Liddell Future Land Use Transport Impact Assessment report) published by GHD in 2023.
- The quantum of future land uses is not currently known.
- Traffic volume data for the New England Highway was sourced from TfNSW count stations.
- The mid-block capacity of the New England Highway was determined in accordance with the Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Method.
- The TfNSW rates associated with Business Parks was used to determine the trip generation of the Energy Hub
- The BPS will cease operation in 2033.
- Subsequent to the closure of the BPS, it has been assumed that 50 percent of the available capacity on the New England Highway will be utilised by the Energy Hub.
- The future traffic volumes on the New England Highway may be impacted by other changes in the Hunter Valley, i.e. the closure of coal mines and the reconfiguration of these sites.
- It has been assumed that upon operation:
  - 60 percent of vehicles associated with the Energy Hub will access/egress the site to and from the south
  - 40 percent of vehicles associated with the Energy Hub will access/egress the site to and from the north
- The assessment of existing conditions of the surrounding network is based on a desktop review of the following data sources:
  - Aerial photography by Google Maps / Nearmap / ArcGIS
  - Street view images by Google Maps
  - Road Crash data published by TfNSW Centre for Road Safety

In summary, the analysis included in this report is high level and based upon existing data sources. It is noted that the land uses associated with the Energy Hub will be subject to a specific application process i.e. Development Application and associated environmental assessments.

1.6 Limitations

This report has been prepared by GHD for AGL and may only be used and relied on by AGL for the purpose agreed between GHD and AGL as set out in this report.

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

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

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

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

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

2. Background context

2.1.1 Hunter Regional Plan 2041

The recently prepared Hunter Regional Plan 2041 (Regional Plan 2041) sets a 20-year strategic land use planning framework for the Hunter Region.

The 2041 vision includes:

- *"A wide range of employment opportunities.*
- *The region is climate resilient and energy and resource efficient. Leadership in reaching net zero emissions represents a key guiding principle for all regional decision-making.*
- *Infrastructure investment supports freight, health, education and waste services, and agribusiness and tourism while building resilience to global economic cycles and climate change.*
- *A skilled science, technology and engineering workforce is engaged in advanced manufacturing, mining and digital technologies".*

The Regional Plan's place strategy for the Lidell and Bayswater Power Station sites includes:

- Plan renewable energy generation.
- Leverage access to energy and site infrastructure like rail and highway access.

The provision of an Integrated Industrial Energy Hub will meet the vision of the Regional Plan 2041. The closure of Liddell power station in 2023 and Bayswater in 2030-2033 will provide opportunities to co-locate other employment generating activities within the SP2 zone. The site offers both rail and highway access, water and infrastructure assets. The Energy Hub will support jobs in manufacturing, waste, freight, and hydrogen, and support planning priority 2:

- *Plan for alternative land uses for former power stations and mining sites.*

2.1.2 State Environmental Planning Policy (Transport and Infrastructure) 2021

Pursuant to Schedule 3 of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&ISEPP) the project is generally considered to be traffic generating development, to be referred to Transport for NSW (TfNSW). Clause 2.121 of T&ISEPP specifies that a consent authority must give written notice to TfNSW of an application for traffic generating development before granting development consent and consider any response provided by TfNSW. Any future development application for development would be subject to Clause 2.121.

2.1.3 Liddell Future Land Use and Enabling Works Project Transport Impact Assessment (2023)

The Liddell Future Land Use Transport Impact Assessment report (which was prepared by GHD in 2023) outlines the transport impact of the decommissioning of the LPS. The assessment approach included a review of publicly available traffic count data and crash statistics as well as data collected by AGL regarding the operation of the grade separated New England Highway Interchange.

The Transport Impact Assessment included traffic survey data from 2018 for the New England Highway Interchange, as displayed in Figure 2.1 and Figure 2.2.

LPS has since been decommissioned and accordingly, the number of staff travelling to/from the power station has largely ceased.

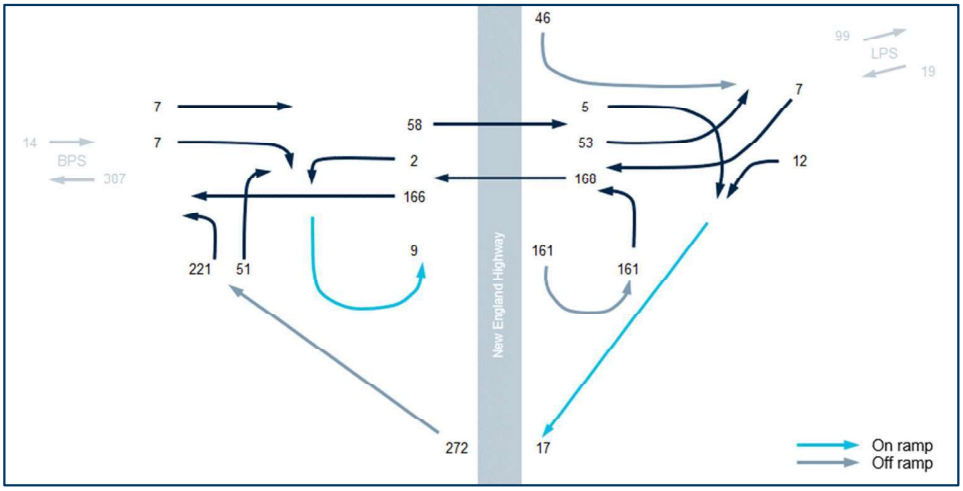


Figure 2.1 New England Highway / LPS and BPS interchange – Existing AM peak volumes (2018)

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment

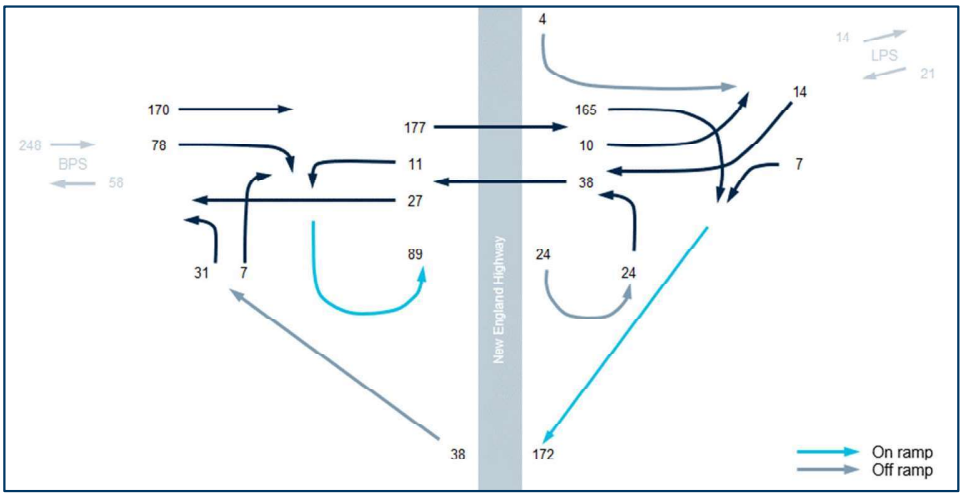


Figure 2.2 New England Highway / LPS and BPS interchange – Existing PM peak volumes (2018)

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment

The 2018 survey data indicates that the BPS is a major employer, generating approximately 400 trips in the AM peak hour and 306 trips in the PM peak hour.

Additionally, the Transport Impact Assessment included future year traffic volumes (2033) based on the removal of the LPS trips and the trips generated by the cumulative projects and land uses. These projects included Ravensworth Composting Facility and the Liddell Battery and Bayswater Ancillary Works.

The future year traffic volumes for the New England Highway Interchange for the AM and PM peak hours are displayed in Figure 2.3 and Figure 2.4, respectively.

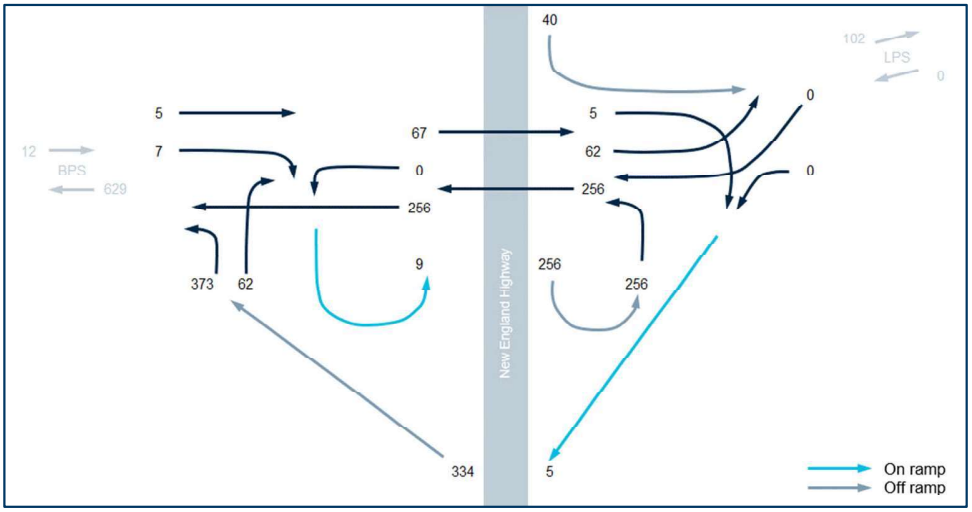


Figure 2.3 New England Highway / LPS and BPS interchange – Future AM peak volumes (2033)

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment – GHD 2023

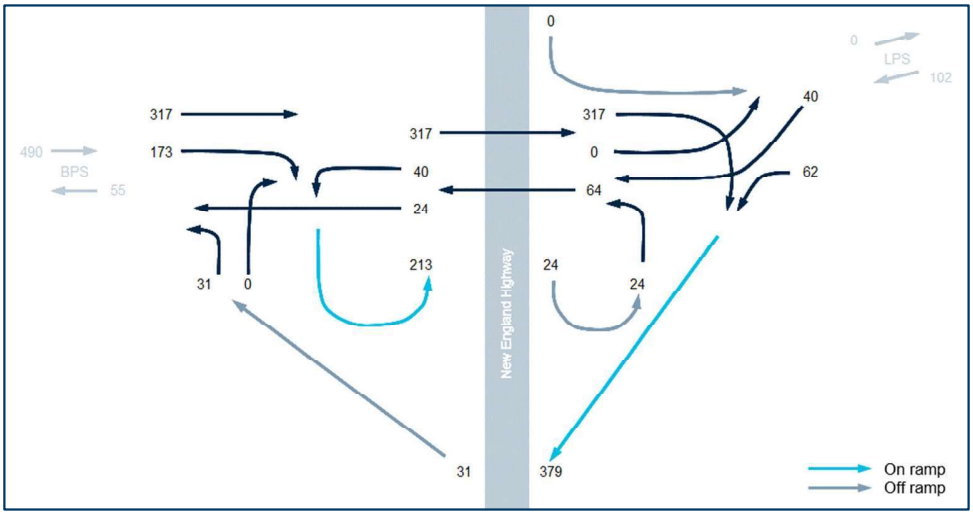


Figure 2.4 New England Highway / LPS and BPS interchange – Future PM peak volumes (2033)

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment – GHD 2023

It is noted that Figure 2.3 and Figure 2.4 indicate that the BPS is in operation, i.e. it does not account for its closure in the future.

The Transport Impact Assessment also included SIDRA modelling of the grade separated New England Highway Interchange. The traffic performance accounted for the five key priority-controlled junctions within the New England Highway Interchange, as shown in Figure 2.5.

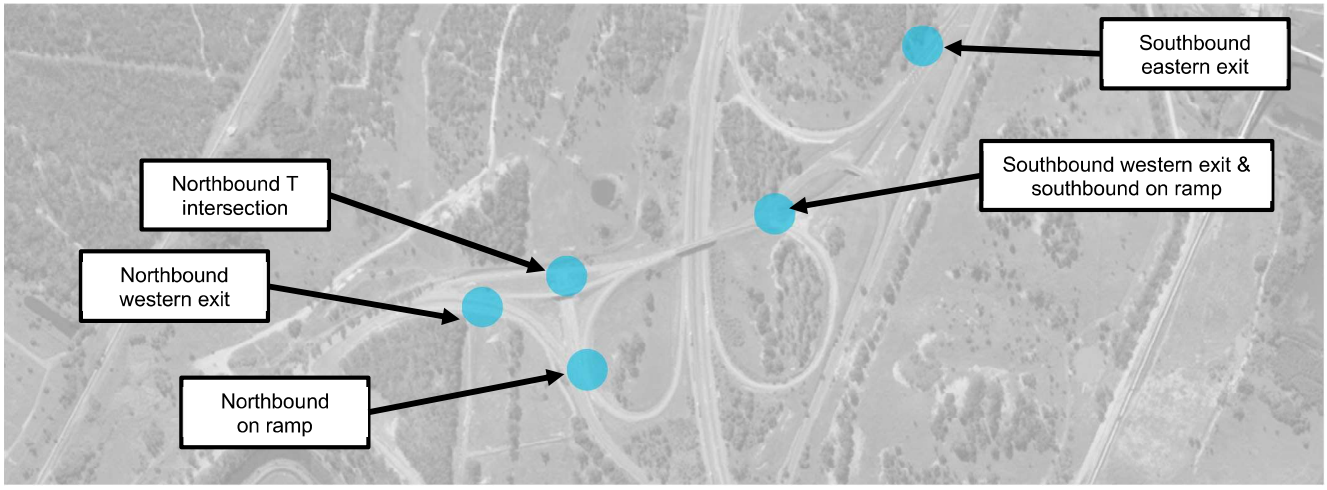


Figure 2.5 SIDRA modelling locations

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment – GHD 2023

The report indicated that the New England Highway Interchange is operating with a very good Level of Service (LoS A) with minor delays, and significant spare capacity, currently (2018) and in the future (2033).

2.1.4 Liddell Battery and Bayswater Ancillary works Project Traffic and Transport Assessment

The Liddell Battery and Bayswater Ancillary Works Project Traffic and Transport Assessment was prepared by Jacobs in 2021 to assess the impacts of a 500-megawatt Battery and associated works. The assessment accounted for cumulative impacts, including the Ravensworth Composting Facility and the Liddell Power Station closure and rehabilitation. The Traffic and Transport Assessment was completed in 2018 and included 2023 “future year” traffic volumes.

The future year traffic volumes (2023) for the New England Highway Interchange for the AM and PM peak hours are displayed in Figure 2.6 and Figure 2.7, respectively.

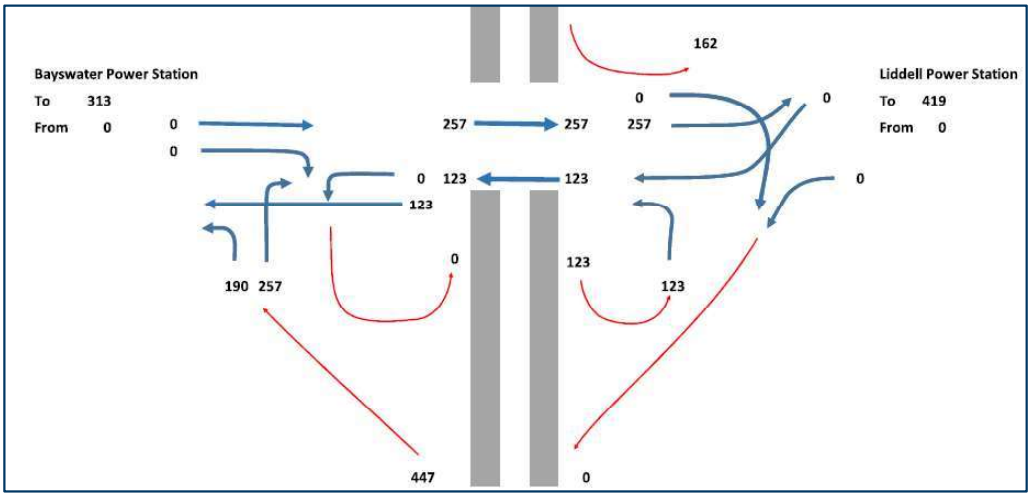


Figure 2.6 New England Highway / LPS and BPS interchange – Future AM peak volumes (2023)

Source: Liddell Battery and Bayswater Ancillary Works Project – Jacobs 2021

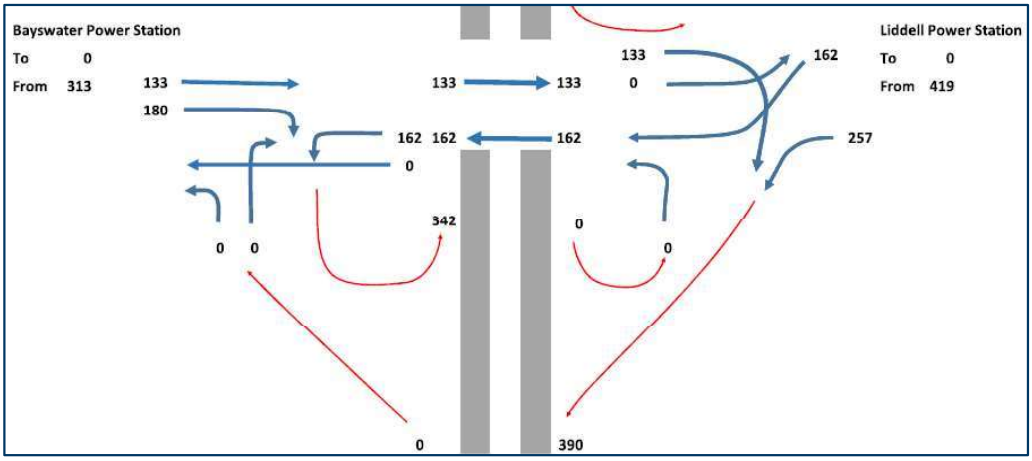


Figure 2.7 New England Highway / LPS and BPS interchange – Future PM peak volumes (2023)

Source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment – Jacobs 2021

SIDRA analysis based on the traffic volumes in Figure 2.6 and Figure 2.7 indicates that the New England Highway Interchange operates at LoS A, currently and for the future year scenario.

3. Existing road network

A map of the existing road network that includes The New England Highway, LPS and BPS access road and interchange, as well as the internal access road are shown below in Figure 3.1. The following subsections describe the roads in proximity to the Energy Hub.

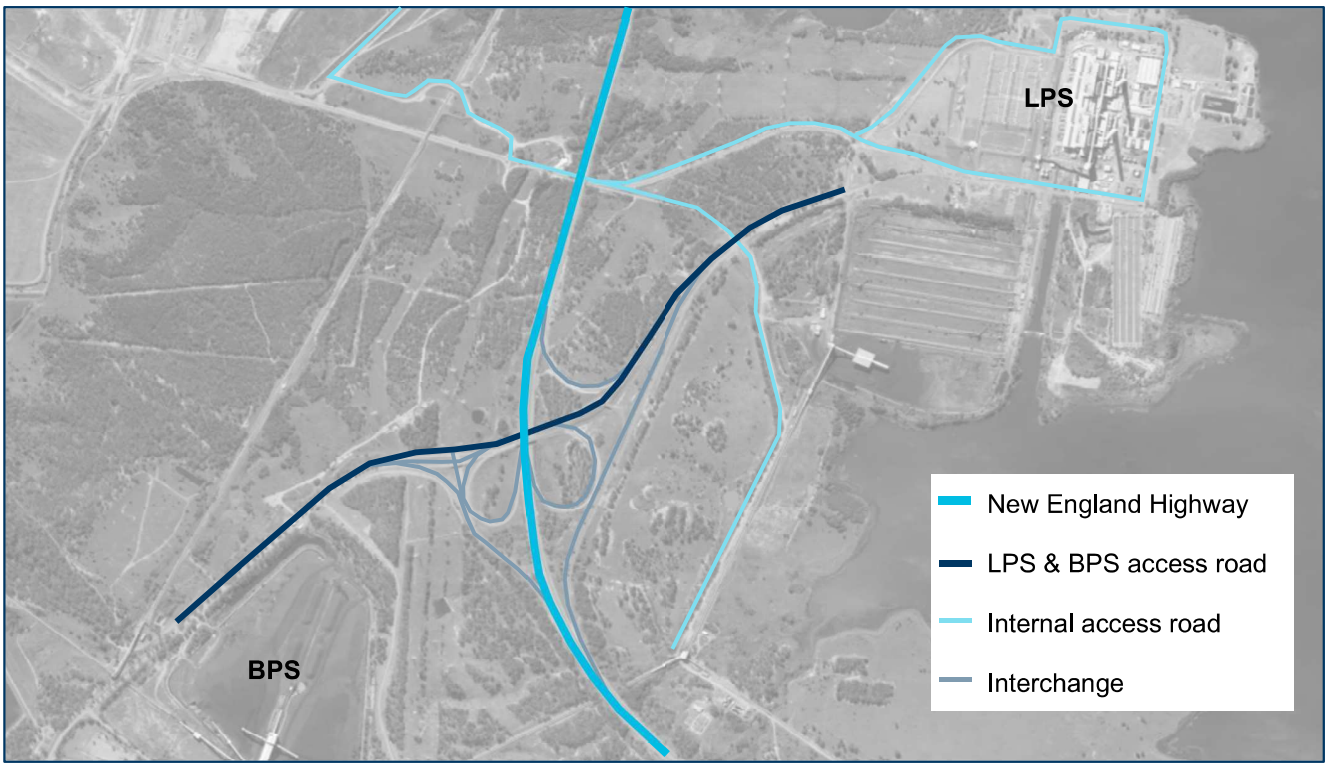


Figure 3.1 Existing Road network

Image source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment (2023) published by GHD

It is noted that the three Energy Hub sites are proposed to be accessed/egressed via the New England Highway Interchange, the LPS access road (Site 3) and BPS access road (Site 1 and Site 2).

3.1.1 New England Highway

The New England Highway is a TfNSW controlled arterial highway running generally north-south, connecting Toowoomba in Queensland to the north, to Hexham near Newcastle, to the south. The New England Highway has a typical posted speed limit of 100 km/h, with reduced speed limits through towns.

In the vicinity of the project, the New England Highway is a dual carriageway with two lanes in each direction and a central median. The New England Highway is an approved B-double and Oversize Overmass (OSOM) transport route.

The following observations of the New England Highway in the vicinity of the site are as follows:

– About 1.4 kilometres south of the interchange, New England Highway changes to one lane in either direction.
– About 400 metres north of the interchange, New England Highway changes to two northbound lanes and one southbound lane.
– About 3.3 kilometres north of the interchange, New England Highway changes to one lane in either direction.

3.1.2 Liddell and Bayswater access road

An unnamed access road runs generally southwest-northeast across the New England Highway, connecting the BPS and LPS. Where the New England Highway bisects the two power stations, a grade separated half clover interchange provides access to/from the highway from the access road.

The access road is a single carriageway road with one lane in each direction. The road has a posted speed limit of 60 km/h where it adjoins the New England Highway, reducing to a posted speed limit of 40 km/h where vehicles access the LPS, to the west at the access to the BPS is a posted speed limit of 20 km/h.

3.2 Public and active transport network

While the Hunter Main North Rail line runs north-south to the east of Liddell Lake, there are no public transport stations or stops within proximity of the Proposal. Furthermore, no formal off-road pedestrian or cycling facilities are provided on the road network near the project site.

3.3 Existing traffic volumes

Traffic volumes along the New England Highway were obtained from the TfNSW Traffic Volume Viewer. Volumes have been obtained from the:

– Counter No. 6154, 1.64 km south of Muscle Creek Road, approximately 11 km north of the LPS/BPS
– Counter No. 6153, 200 metres north of Rixs Creek Lane, approximately 28 km south of the LPS/BPS

Figure 3.2 Traffic counter locations
Image source: Liddell Future Land Use and Enabling Works Project Transport Impact Assessment (2023) published by GHD

The average weekday traffic volumes for site 6153 in 2022 are displayed in Figure 3.3

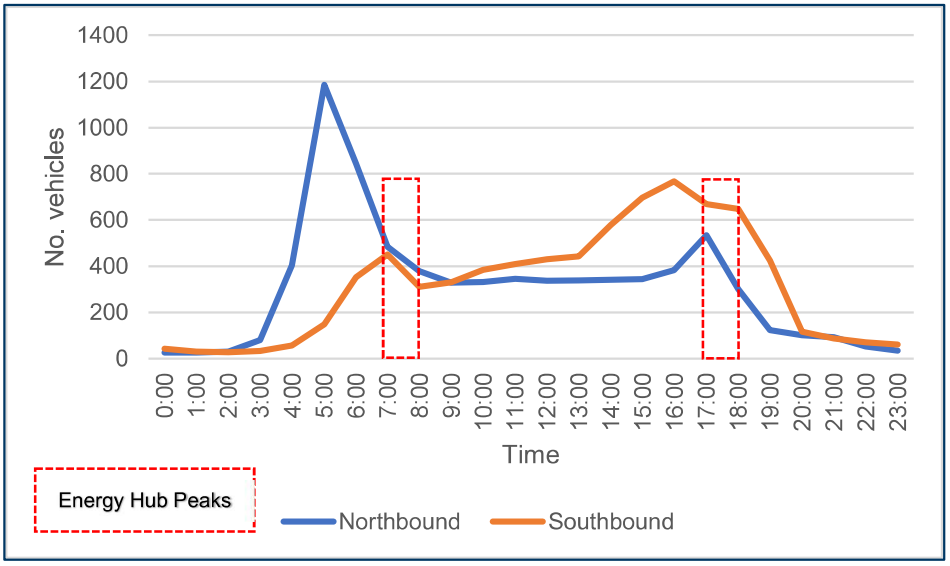


Figure 3.3 New England Highway traffic volumes – counter number 6153

Source: TfNSW

The data in Figure 3.3 indicates that on the New England Highway south of the Energy Hub site:

– Peak morning vehicle activity occurs between 5:00 am and 6:00 am (1,333 vehicles), during this period traffic volumes are predominantly northbound.

– Peak afternoon vehicle activity occurs between 5:00 pm – 6:00 pm (1,201 vehicles).

It is assumed that the peak morning vehicle activity is predominantly associated with workers accessing the mines in the Hunter Valley region. As detailed in Section 4.2.3, the peak hour morning activity associated with the Energy Hub, is likely to occur later (in the order of 7:00 am – 8:00 am). Further, it is assumed that the Energy Hub peak afternoon activity will coincide with the road network peak detailed in Figure 3.3.

The average weekday traffic volumes for site 6154 in 2022 are displayed in Figure 3.4.

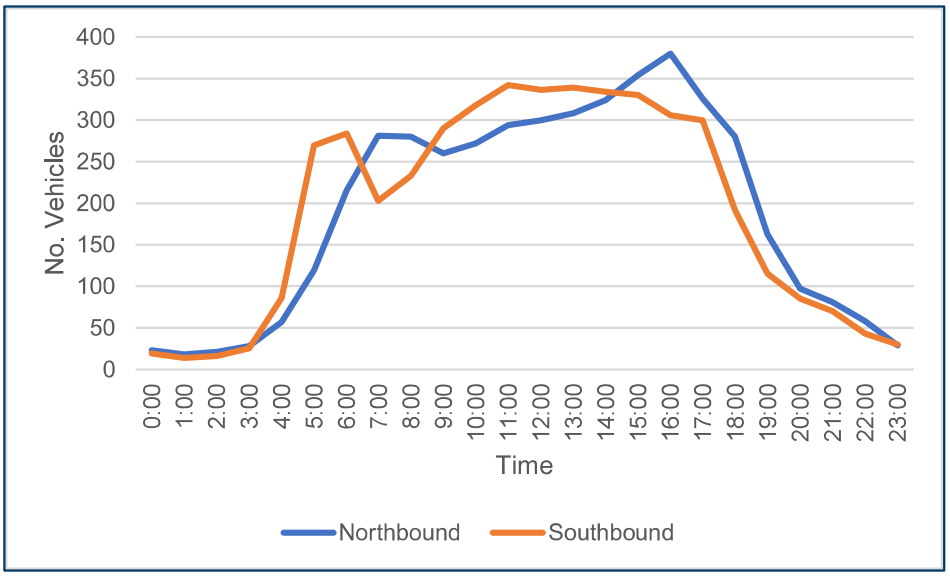


Figure 3.4 New England Highway traffic volumes – counter number 6154

The data in Figure 3.4 indicates that on the New England Highway north of the Energy Hub site:

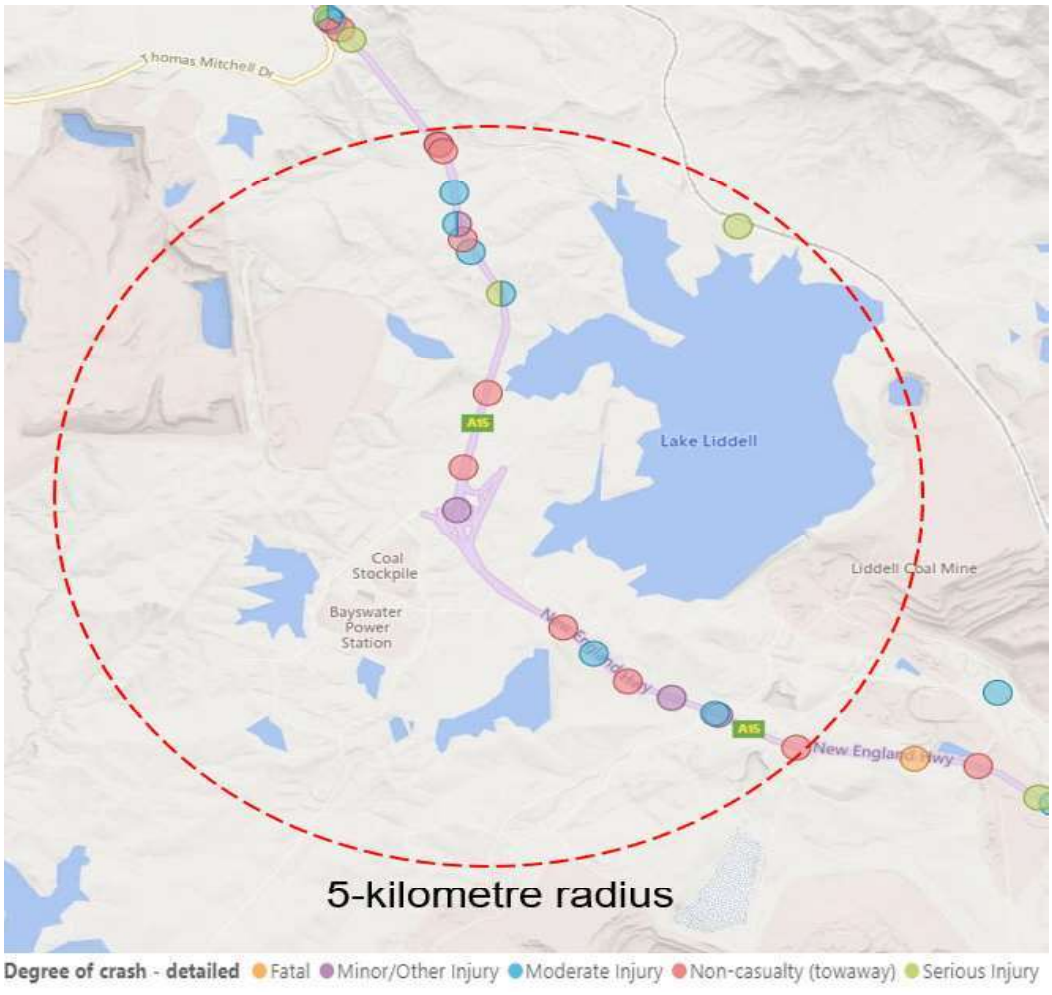
– Peak morning vehicle activity occurs between 11:00 am and 12:00 pm (636 vehicles).
– Peak afternoon vehicle activity occurs between 4:00 pm – 5:00 pm (686 vehicles).

The TfNSW count station data indicates that there are higher traffic volumes on the New England Highway south of the Energy Hub subject site compared to the north. Accordingly, the southern section of the New England Highway provides a greater constraint to the potential vehicle activity associated with the Energy Hub compared to the north.

It is noted that the Mt Arthur Coal Mine (which is the largest in NSW), which is located approximately ten kilometres north of the Energy Hub is expected to close in 2030, which will reduce the volumes of vehicles traversing the New England Highway in proximity to the Energy Hub.

3.4 Crash history

Road crash history for the five-year period from 2018 to 2022 was obtained from the TfNSW Centre for Road Safety. The area of assessment included the LPS and BPS access road and the New England Highway, approximately 5 km north and south of the interchange. Within the analysis period, there were a total of 21 recorded crashes. A map of crash incident locations is provided in Figure 3.5.



Source: NSW Road Crash Data 2018-2022 (TfNSW Centre for Road Safety, 2023), modified by GHD

Figure 3.5 Road crash incidents within a 5.0-km radius of the area of assessment

A summary of the road crash categories is provided in Figure 3.6. The predominant crash type category is *off-path, on curve or turning* (9 incidents), followed by off-path, on straight (6 incidents).

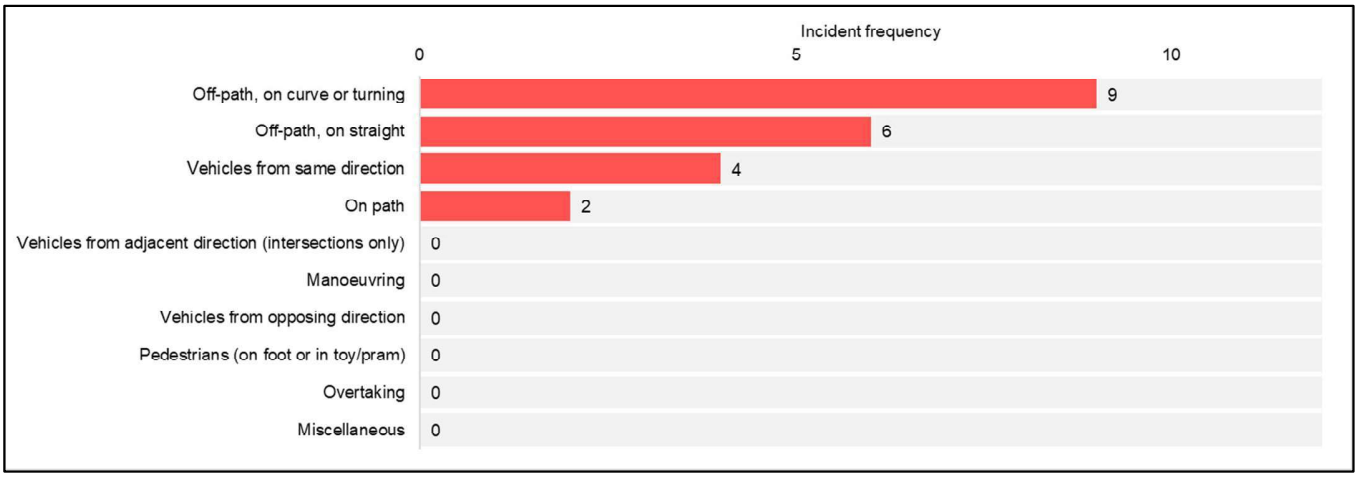


Figure 3.6 ***Incident frequency per road crash category***

All crashes recorded within the last five years occurred on the New England Highway with the exception of one crash on Hebden Road (the northern eastern crash in the survey area). The majority of crashes are non-casualty injuries, which is 38 percent of reported crashes and followed by moderate injury by 24 percent. There were two serious injuries occurred during the night and dusk as the vehicles ran off the road.

Table 3.1 ***Degree of crashes within the area of assessment***

Year	Degree of Crash					Total
	Non-casualty (towaway)	Minor/Other Injury	Moderate Injury	Serious Injury	Fatal	
2018	2	1	0	0	0	3
2019	1	0	2	0	0	3
2020	1	1	0	0	0	2
2021	3	2	3	1	0	9
2022	1	1	1	1	0	4
Total	8	5	6	2	2	21

4. Impact assessment

4.1 Future land uses

The intention of the Proposal is to seek an amendment to the LEP so as to permit compatible additional uses to support the ongoing clean energy transition and support an integrated industrial Energy Hub. Compatible future uses of the site that have been identified and are market dependent include:

- Energy generation and storage.
- Manufacturing of renewable energy components (i.e., solar panels).
- Recycling of renewable energy components (i.e. material recycling facilities for solar panels and/or lithium batteries).
- Manufacture of building materials using materials sourced from on-site such as coal ash from power station activities.
- Agricultural produce industry to support ongoing agricultural land uses in the region as coal fired power stations and mines progressively close.
- Ancillary activities and services to support the needs of businesses and workers.

Once both the LPS and BPS closures occur, when structures are demolished and the site rehabilitated, AGL are committed to redeveloping the site into an integrated industrial Energy Hub. The proposed changes to the MLEP 2009 will aim to provide a flexible approach to future development on the site in the short, medium and long term to allow for a range of industrial land uses to occur in accordance with state and local government expectations.

The 2041 Regional Plan supports the development of alternative land uses dependant on the characteristics of the site and its surrounds.

4.2 Capacity assessment

4.2.1 Trip generation rates

A high-level traffic impact assessment has been undertaken, to assess the extent the surrounding road network of the subject site to accommodate vehicle activity associated with the Energy Hub. The analysis has been based on:

- The operation of the grade separated New England Highway Interchange.
- The mid-block capacity of the New England Highway, assuming a single travel lane in either direction.

To determine the expected peak hour vehicle activity trip generation rates, reference has been made to the TfNSW Technical Direction (TDT 2013/04a) for “business parks”. TfNSW identifies business parks as:

Developments that permit a range of land-use types in an integrated complex. The developments generally incorporate a number of individual units of similar size. The developments typically include elements of industrial, manufacture, research, warehousing, office space, retail, commercial, refreshment and recreational activity. They are generally located in industrial areas and the uses within the park are generally to a scale appropriate for the anticipated workforce.

It is considered that the business park criteria are suitable to assess the expected traffic characteristics of the Energy Hub at a high-level as it would accommodate a number of related uses such as large format industrial development and associated office space.

For regional business parks, the trip rates in the Technical Direction are based on a series of surveys completed by TfNSW. For “regional” areas the Technical Direction specifies a range of trip rates as follows:

- AM peak hour 0.32 – 1.20 trips per 100 m^2 GFA.

– PM peak hour 0.39 – 1.30 trips per 100 m^2 GFA.

The outputs of the surveys are provided in Appendix E of the Technical Direction, and a summary of some sites are provided in Table 4.1.

Table 4.1 Business Park Data

Location	Tuggerah	Albion Park	Rutherford	Beresford	Port Stephens
Size m^2	136,737	42,899	29,766	89,291	19,881
No. factories	6	0	1	5	0
No. factories/warehouses	2	0	0	2	0
No. warehouses	41	13	5	23	3
No. offices	93	4	3	7	1
No. retailers	16	25	1	2	6
No. workshops	0	9	3	7	1
No. manufacturers	2	0	0	2	10
No. Other commercial	23	15	5	2	5
Trip Rate per 100 m^2 GFA	**0.92**	**0.97**	**0.58**	**0.56**	**0.39**

The data in Table 4.1 indicates that business parks with a significant portion of retail facilities have higher generation rates compared to those without them.

Given the location of the land and its suitability for large format industrial land uses, it is not expected to include a high proportion of retail facilities. Therefore, for the purpose of analysis, the yield analysis has been undertaken utilising a trip rate of 0.56 trips per 100m^2 similar to the industrial estate example in Beresford. This represents a more conservative assessment compared to the Port Stephens site.

4.2.2 Interchange review

As detailed in Section 2.1.3, the volumes for vehicles accessing/egressing the BPS and LPS in the future year scenario (subsequent to 2023) is as follows:

– Future AM peak hour:
  - BPS - 629 inbound and 12 outbound
  - LPS - 102 inbound and zero outbound
– Future PM peak hour:
  - BPS - 55 inbound and 490 outbound
  - LPS – zero inbound and 102 outbound

As detailed in Section 2.1.4, the Jacobs Traffic and Transport Assessment, the volumes for vehicles accessing/egressing the BPS and LPS in the future year (approximately 2023) scenario is as follows:

– Future AM peak hour:
  - BPS - 313 inbound and zero outbound
  - LPS - 419 inbound and zero outbound
– Future PM peak hour:
  - BPS - zero inbound and 313 outbound
  - LPS – zero inbound and 419 outbound

Based on the above, the highest peak hour volumes for the BPS is 641 trips (AM peak hour) and the LPS 419 trips (PM peak hour). Under both these scenarios the traffic modelling indicates that the New England Interchange will operate with a good level of service (LoS A) with minimal delays (refer to Section 2).

For the purpose of analysis, it has been assumed that once the BPS is closed in the future, the primary vehicle activity at the New England Interchange will be associated with the Energy Hub.

Therefore, the available data indicates that the New England Highway Interchange has a significant capacity to accommodate vehicle trips associated with the Energy Hub and operate with acceptable levels of service.

4.2.3 Mid-block assessment

The high level assessment to determine the potential yield of the LPS and BPS sites has also been undertaken based on the capacity of the New England Highway.

The Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Method indicates that, corresponding to a LoS D and a free flow speed of 100 km/h, highways have a capacity of 1,980 vehicles/hour/lane (veh/h/ln).

To determine the future volumes (subsequent to the closure of the BPS) on the New England Highway, the following methodology has been adopted:

– The current traffic volumes have been sourced from a TfNSW count station.
– The portion of the current traffic volumes associated with the operation of the BPS/LPS have been sourced from the 2018 traffic counts detailed in Section 2.1.3.

As detailed in Section 3.3, on the New England Highway (south of the Energy Hub subject site), peak vehicle activity currently occurs between 5:00 am - 6:00 am and 5:00 pm – 6:00 pm. As stated previously:

– It is assumed that the 5:00 am - 6:00 am peak is associated with the operation of the Hunter Valley mines.
– A number of mines in the Hunter Valley are expected to close in the coming years, i.e. the Mt Arthur Coal Mine.

It is expected that the peak vehicle activity associated with the Energy Hub will occur between 5:00 am to 6:00am. For the purposes of analysis, it is assumed the peak vehicle activity associated with the Energy Hub will occur between 7:00 am – 8:00 am and 5:00 pm - 6:00 pm (which is generally consistent with the 2018 traffic survey detailed in Section 2.1.3).

The current traffic volumes associated with these peak hours, based on the outputs of the TfNSW count station - Counter No. 6153 located south of the Energy Hub, are detailed in Table 4.2.

Table 4.2 Peak hour volumes along New England Highway - 2022

	AM Peak 7:00 am – 8:00 am	PM Peak 5:00 pm – 6:00 pm
Northbound	483 vph	533 vph
Southbound	450 vph	668 vph
Total	**933 vph**	**1,201vph**

It is noted that a portion of these traffic volumes are currently associated with the operation of the BPS, which is expected to close prior to 2035.

The outputs of the 2018 traffic surveys detailed in Section 2.1.3 indicate that for the BPS:

– In the AM peak hour:
  - 221 vehicles access the BPS from the south
  - Seven vehicles egress the BPS to the south

– In the AM peak hour:
  - 31 vehicles access the BPS from the south
  - 170 vehicles egress the BPS to the south

The current vehicle activity associated with the BPS based on the outputs of the 2018 traffic surveys are displayed in Table 4.3.

Table 4.3 BPS peak hour volumes along New England Highway - 2022

	AM Peak 7:00 am – 8:00 am	PM Peak 5:00 pm – 6:00 pm
Northbound	221 vph	31 vph
Southbound	7 vph	170 vph
Total	**228 vph**	**201 vph**

It is noted that:

– Upon its closure, it is assumed that the BPS trips on the New England Highway will be replaced by vehicle activity associated with the operation of the Energy Hub.
– Accordingly, all of the BPS vehicle trips have been deducted from the 2022 traffic volumes on the New England Highway to determine the future traffic volumes (subsequent to the closure in 2035).
– The updated peak hour traffic volumes for the future year scenario on the New England Highway (excluding 50 percent of the current BPS peak hour trips) are displayed in Table 4.4.

Table 4.4 Peak hour volumes along New England Highway – subsequent to 2033

	AM Peak 7:00 am – 8:00 am	PM Peak 5:00 pm – 6:00 pm
Northbound	262 vph	502 vph
Southbound	443 vph	498 vph
Total	705 vph	1,000 vph

As detailed previously, Austroads Guidelines specify that highways have capacities of 1,980 veh/h/ln. Based on the expected future year vehicle activity detailed in Table 4.4, the future remaining capacity of the New England Highway is summarised in Table 4.5.

Table 4.5 Expected remaining capacity of New England Highway – subsequent to 2033

	AM Peak 7:00 am – 8:00 am	PM Peak 5:00 pm – 6:00 pm
Northbound	1,718 vph	1,478 vph
Southbound	1,537 vph	1,482 vph

The data in Table 4.5 indicates that:

– The least capacity for the New England Highway will occur in the AM and PM peak hours in the southbound travel lane.
– For the analysis of the potential size of the Energy Hub based on the remaining capacity of the New England Highway, it has been assumed that 50 percent of the remaining capacity on the New England Highway could be utilised by the Energy Hub.
– The assumed peak hour activity associated with the Energy Hub on the New England Highway (south of the Energy Hub) based on 50 percent of the available remaining capacity, subsequent to 2033 is displayed in Table 4.6.

Table 4.6 Energy Hub assumed peak hourly vehicle activity 50 percent scenario – subsequent to 2033

Scenario	Direction	AM Peak 7:00 am – 8:00 am	PM Peak 5:00 pm – 6:00 pm
50 percent of capacity	Northbound	859 vph	739 vph
	Southbound	769 vph	741 vph

It is noted that:

– In accordance with the available traffic data from the New England Highway count station (6153), it has been assumed that:
  - 40 percent of the vehicle activity associated with Energy Hub will access and egress it to/from the north.
  - 60 percent of the vehicle activity associated the Energy Hub will access and egress it to/from the south.
– Accordingly, it is assumed that the peak hourly vehicle activity detailed in Table 4.6 is associated with 60 percent of the overall vehicle activity at the Energy Hub.

Mid-block analysis has been undertaken utilising the PM southbound traffic flows as a "worst case" scenario to determine the potential size of the Energy Hub.

Accordingly, 741 vehicle trips in the PM peak hour is consistent with 132,000 m^2 / 13.2 hectares of development, i.e. 13.2 hectares @ 0.56 trips per 100 m^2 = approximately 740 trips.

Assuming that 132,000 square metres/ nine hectares constitute 60 percent of the overall Energy Hub, then the overall size of the Energy Hub, that could be accommodated on the New England Highway would be in the order of 220,000 square metres / 22 hectares of Gross Floor Area (GFA).

It is noted that upgrades to the road network, potentially including providing additional travel lanes on the New England Highway, south of the site, would support a further potential increase in the developable yield of the Energy Hub.

5. Summary

AGL are committed to redeveloping the site into an integrated industrial Energy Hub. The proposed changes to the LEP aim to provide a flexible approach to future development on the site in the short, medium, and long term to allow for a range of land uses to occur in accordance with state and local government expectations. Allowing the transition to commence prior to the closure of BPS, and as the LPS is rehabilitated, will reduce shocks to the social and economic conditions in the Upper Hunter.

Compatible future uses that have been identified but are market dependent include:

- Energy generation and storage.
- Manufacturing of renewable energy components (i.e., solar panels).
- Recycling of renewable energy components (i.e. material recycling facilities for solar panels and/or lithium batteries).
- Manufacture of building materials using materials sourced from on-site such as coal ash from power station activities.
- Agricultural produce industry to support ongoing agricultural land uses in the region as coal fired power stations and mines progressively close.
- Ancillary activities and services to support the needs of businesses and workers.

GHD was engaged by AGL to prepare a Traffic Assessment to support the preparation of the Proposal. The TA has identified the capacity and road network performance of existing traffic conditions and available capacity to facilitate development envisaged by the amendment of LEP for an integrated industrial Energy Hub (Energy Hub). This report has:

- Described the existing environment with respect to the project.
- Assessed the capacity of the road network to accommodate the expected trip generation of the Energy Hub.
- Determined the potential size of the Energy Hub in accordance with the capacity of the adjoining road networks in accordance with Transport for NSW (TfNSW) trip generation rates.

The preparation of this assessment has relied on the following data sources and assumptions:

- Available traffic data for the intersections of interest has been sourced from the Transport Impact Assessment for Liddell Future Land Use and Enabling Works Project (the Liddell Future Land Use Transport Impact Assessment report) published by GHD in 2023.
- The available data indicates that the New England Highway Interchange currently operates with a very good Level of Service with minor delays and spare capacity now and in the future, to 2033.
- The quantum of future land uses is not currently known.
- Traffic volume data for the New England Highway was sourced from TfNSW count stations.
- The mid-block capacity of the New England Highway was determined in accordance with the Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Method.
- The TfNSW rates associated with Business Parks was used to determine the trip generation of the Energy Hub
- The BPS will cease operation in 2033.
- Upon its closure, it is assumed that the BPS trips on the New England Highway will be replaced by vehicle activity associated with the operation of the Energy Hub.
- Subsequent to the closure of the BPS, it has been assumed that 50 percent of the available capacity on the New England Highway will be utilised by the Energy Hub.
- The future traffic volumes on the New England Highway may be impacted by other changes in the Hunter Valley i.e. the closure of coal mines and the reconfiguration of these sites.

– It has been assumed that upon operation:
    - 60 percent of vehicles associated with the Energy Hub will access/egress the site to and from the south.
    - 40 percent of vehicles associated with the Energy Hub will access/egress the site to and from the north.
– It is noted that the Mt Arthur Coal Mine (which is the largest in NSW), which is located approximately ten kilometres north of the Energy Hub is expected to close in 2030, which will reduce the volumes of vehicles traversing the New England Highway in proximity to the Energy Hub.

In summary, the analysis included in this report is high level and based upon existing data sources. It is noted that the land uses associated with the Energy Hub will be subject to a specific application process i.e. Development Application and supporting environmental assessments.

In accordance with the available information and the listed assumptions, the overall size of the Energy Hub, that could be accommodated on the New England Highway would be in the order of 220,000 square metres / 22 hectares of GFA.