McCullys Gap Battery Energy Storage System

Technical Report 7 – Traffic and Transport Impact Assessment

August 2026



Executive summary

The project

Muswellbrook Pro Unit Holdings Pty Ltd (the applicant) is proposing the McCullys Gap Battery Energy Storage System (BESS) (the project) in McCullys Gap, NSW. The project involves constructing, operating (including maintenance) and decommissioning a BESS and associated infrastructure to connect into the NSW high voltage electricity transmission network.

Once operational, the project would store and dispatch energy, contributing to a stable, reliable and diverse energy system in NSW.

This report

This report forms a technical appendix to the Environmental Impact Statement (EIS) prepared in support of an application for approval of the project in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW).

This report assesses the potential traffic and transport impacts of the project in accordance with the requirements of the Planning Secretary's Environmental Assessment Requirements (the SEARs).

Existing environment

The project is located on parts of 380 and 578 Sandy Creek Road, McCullys Gap, NSW, six kilometres northeast of Muswellbrook (the project area). The project is located within the Muswellbrook Shire local government area (LGA) and is located in the Hunter-Central Coast Renewable Energy Zone.

The New England Highway (A15) and other arterial roads in proximity to the project area are authorised to accommodate 25-metre / 26-metre B-doubles. The Restricted Access Vehicle (RAV) maps also indicate that Sandy Creek Road is authorised to accommodate 19-metre B-doubles that exceed General Access Vehicle mass limits. However, RAV vehicles are not permitted to travel on Sandy Creek Road between 7.30am and 8.30am and 3.45pm and 4.45pm on school days.

New England Highway (A15) and other arterial roads in proximity to the project area are authorised to accommodate oversize overmass (OSOM) vehicles. It is noted that a section of the New England Highway (A15) within Muswellbrook, between Maitland Road and Market Street, is restricted to vehicles that do not exceed a width of 4.6 metres, a height of 5 metres, and a length of 30 metres.

A rail crossing with signage and warning lights is provided across Sandy Creek Road, approximately 45 metres to the east of the New England Highway (A15). In addition to commuter services, freight, grain and coal trains also traverse the rail line. The available data indicates that up to (approximately) 60 trains traverse the rail crossing on Sandy Creek Road over a 24-hour period.

To identify the existing traffic conditions in proximity to the project area, weekday AM and PM peak period traffic counts were undertaken on Thursday, 5 June 2025, at the intersection of New England Highway (A15) and Sandy Creek Road. The traffic counts were undertaken in 15-minute intervals for the following times to coincide with peak periods of road network activity:

– 6 am to 9 am
– 4 pm to 7 pm

SIDRA intersection modelling indicates that the intersection of New England Highway (A15) and Sandy Creek Road currently operates at a good level of capacity during peak periods of road network activity (Level of Service A).

A midblock assessment indicates that the New England Highway (A15) and Sandy Creek Road currently operate with traffic volumes well below their maximum capacity in peak hours and throughout the rest of the day.

Construction impacts

In accordance with the *Guide to Transport Impact Assessment* (Transport for NSW, 2024), the traffic assessment considers cumulative construction traffic from the project as well as other relevant future developments to ensure realistic future network conditions as assessed. Four approved and planned developments were identified within the study area that may overlap with the project's construction period:

– Muswellbrook Solar Farm
– Muswellbrook BESS
– Muswellbrook Bypass
– Queensland Hunter Gas Pipeline

Collectively, these developments and the project are estimated to generate approximately 355 vehicle trips during the construction peak hour at the intersection of New England Highway and Sandy Creek Road.

It is anticipated that a peak of 150 construction workers would be required over the anticipated 18-month construction period. It has been assumed that:

– 60 per cent of construction workers would use shuttle buses (at 25 workers per vehicle)
– 40 per cent of construction workers would drive (with a car occupancy of 1.2), i.e. one in five light vehicles would have a driver and a passenger.

The movement of workers to and from the project area is expected to generate up to:

– four inbound and four outbound shuttle buses in both the AM and PM peak hours
– 50 inbound light vehicles in the AM peak hour
– 50 outbound light vehicles in the PM peak hour.

It is assumed that up to 80 heavy vehicles will access/egress the project area per day. It has been assumed that 10 heavy vehicles would access/egress the project area in a single hour.

Intersection modelling indicates that in 2028 (the assessment year), the intersection of New England Highway (A15) and Sandy Creek Road is expected to continue to operate with an acceptable level of service under both the "no build" and "build" scenarios. A mid-block assessment also indicates that New England Highway (A15) and Sandy Creek Road would continue to operate below capacity.

A sight distance assessment indicates that temporary speed management on Sandy Creek Road would be required during construction in the vicinity of the project access points to achieve Austroads Safe Intersection Sight Distance requirements. A number of high-risk oversize overmass (OSOM) vehicle movements will be required during construction, with the delivery vehicle for the transformer adopted as the governing design vehicle for route assessment between the Port of Newcastle and the project area. The assessment indicates that no permanent road works are required to accommodate the transformer delivery vehicle. However, localised temporary works and traffic management would be required at specific locations, including the New England Highway (A15) / Sandy Creek Road intersection and the project access point at 578 Sandy Creek Road.

Traffic management measures may also be required to manage potential queueing near the Sandy Creek Road rail crossing due to the limited vehicle storage between the New England Highway (A15) and the crossing. No impacts on rail operations, school bus services and active transport are expected.

Operational and decommissioning impacts

The project is proposed to operate remotely 24 hours a day, seven days a week, with up to six operational staff required monthly or quarterly to carry out periodic maintenance activities, including equipment testing and maintenance, vegetation management, pest control and general site maintenance.

Given the very small number of staff associated with the operation (including maintenance activities), operational traffic impacts are expected to be negligible.

At the end of the project's operational life, decommissioning would be undertaken in accordance with the process outlined in chapter 3 (Project description) of the EIS as required by applicable legislation and industry standards.

Decommissioning activities are expected to be significantly less intensive than construction activities, involving fewer personnel and less equipment. As such, vehicle volumes and traffic movements would be lower than during construction, and negligible impacts on the local and regional road network are expected.

Mitigation

The project will include the development and implementation of a Construction Environmental Management Plan, including a Construction Traffic Management Plan during construction, which will outline measures to manage potential traffic impacts.

The Construction Traffic Management Plan will describe how traffic and access will be managed for the duration of construction, including the processes, responsibilities and management measures required to minimise impacts on the surrounding road network. It will also include a driver's code of conduct to support safe and consistent heavy-vehicle operations.

Further detailed planning and permitting relating to OSOM movements will be carried out in conjunction with relevant stakeholders, including Transport for NSW, Council, ARTC and others, including verification of vehicle route and design vehicle. Necessary temporary works will be undertaken prior to movements occurring, along with any other conditions imposed by the transport authorities.

Conclusion

Mitigation and management measures have been identified to avoid and minimise potential impacts on traffic and transport infrastructure. With the implementation of the identified measures, impacts during construction are expected to be minimal and primarily associated with the management of OSOM movements and local traffic management. Traffic impacts during operation and decommissioning are expected to be negligible.

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Appendix C OSOM Route Assessment
Appendix D Strategic Concept Designs

Glossary and abbreviations

Abbreviation/term	Definition
AGTM	Austroads Guide to Traffic Management
ARTC	Australian Rail Track Corporation
AS	Australian Standard
AUR	Auxiliary right-turn lane
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
CHR	Channelised Right-turn treatment
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
GAV	General Access Vehicles
HV	High Voltage
ICNG	Interim Construction Noise Guideline
Km/h	Kilometres per hour
LoS	Level of Service
MW	Megawatt
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
OEMP	Operational Environmental Management Plan
OSOM	Oversize Overmass vehicle – a heavy vehicle that does not comply with a prescribed mass (including gross mass, axle or axle group mass) or dimension requirement.
PCE	Passenger car equivalent
pc/h	Passenger cars per hour
pcu	Passenger car unit
Project	Construction, operation and decommissioning of the McCullys Gap Battery Energy Storage System (BESS).
Project area	The area required to construct and operate the project.
REZ	Renewable Energy Zone
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SIDRA	SIDRA Intersection modelling software
SSD	State significant development
SSI	State significant infrastructure
RAV	Restricted Access Vehicle
SISD	Safe Intersection Sight Distance
Study area	For the purpose of the traffic and transport assessment, the study area includes the McCullys Gap BESS project area, the intersection of the New England Highway (A15) and Sandy Creek Road, and the section of Sandy Creek Road between the project area and its intersection with the New England Highway (A15).
Transport for NSW	Transport for New South Wales
VCR	Volume to capacity ratio

1. Introduction

1.1 Project overview

Muswellbrook Pro Unit Holdings Pty Ltd (the applicant) is proposing the McCullys Gap Battery Energy Storage System (BESS) (referred to as the 'project' for the purposes of this document) in McCullys Gap, New South Wales (NSW). The project involves constructing, operating (including maintaining) and decommissioning a BESS and associated infrastructure to connect into the existing NSW high voltage electricity transmission network.

Once operational, the project would store and dispatch energy, contributing to a stable, reliable and diverse energy system in NSW.

The project is State significant development (SSD) in accordance with section 2.6(1) of State Environmental Planning Policy (Planning Systems) 2021 and is subject to approval and assessment in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

This report forms a technical appendix to the Environmental Impact Statement (EIS) prepared in support of an application for approval of the project.

1.1.1 Location

The project is located on parts of 380 and 578 Sandy Creek Road, McCullys Gap, NSW, about six kilometres northeast of Muswellbrook (referred to as 'the project area' for this report), within the Muswellbrook Shire local government area (LGA) and the Hunter-Central Coast Renewable Energy Zone (REZ) (refer to Figure 1.1).

1.1.2 Key project features

The key features of the project include:

– 400 MW battery energy storage system, with a duration of up to four hours (1,600 MWh) with associated power control, transformers, switchgear and safety systems.
– connection infrastructure, including a project substation, 800 metre transmission line and associated infrastructure to connect the project substation to the existing Muswellbrook 330 kV substation.
– works at the existing Muswellbrook 330 kV substation to facilitate the connection of the project's connection infrastructure to the high-voltage transmission connection point.
– associated ancillary and enabling infrastructure, including operation and maintenance facilities, internal access, fencing, drainage, firewater facilities, safety and security infrastructure.

During construction, temporary facilities would be established on site, including a site office, compounds and laydown areas.

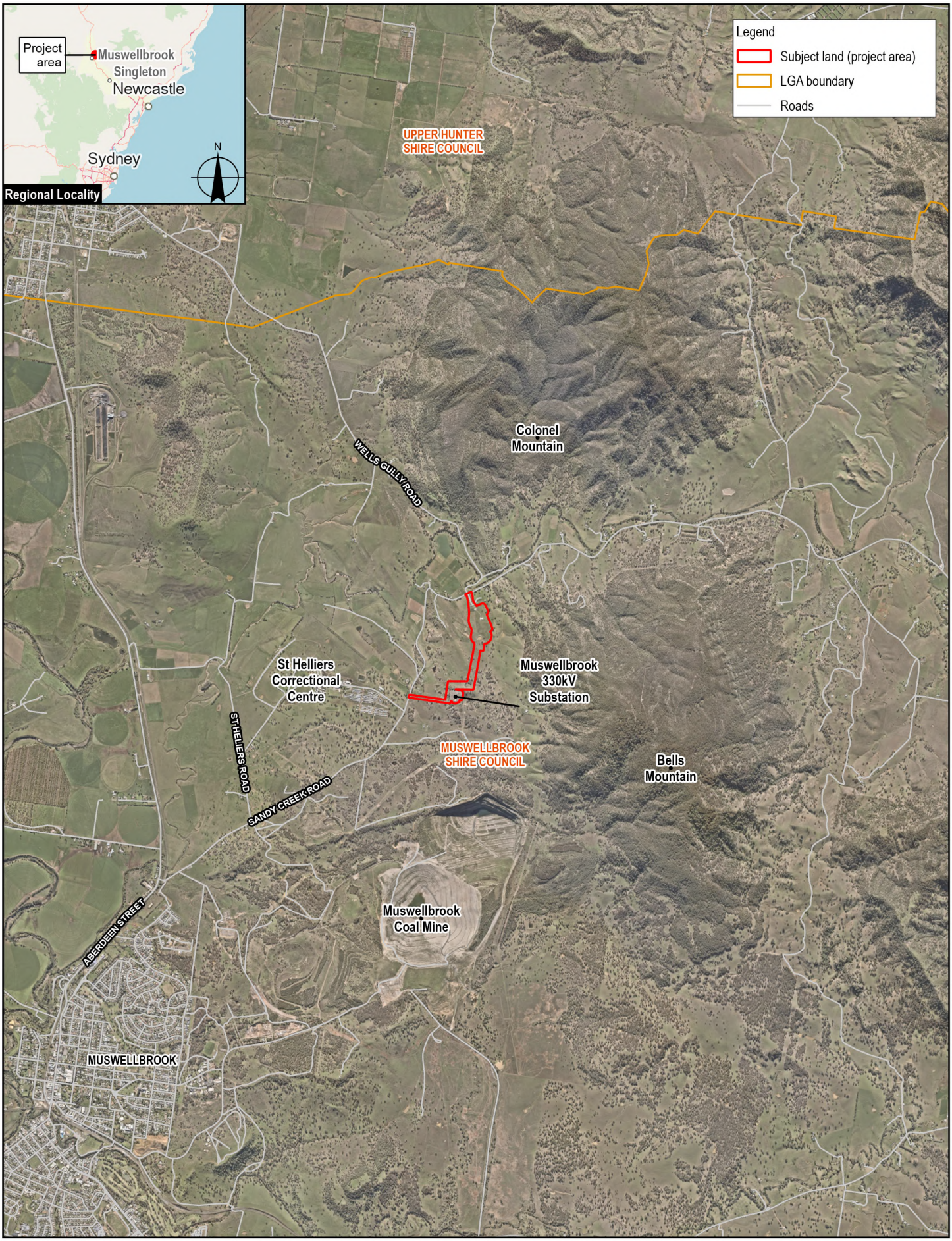
Further information about the project is provided in chapter 3 (Project description) of the EIS.

1.1.3 Timing

Construction is anticipated to start in 2027, subject to obtaining necessary approvals, and would take about 18 months. The project may be constructed in one or more stages. Operation is planned to commence in 2029 following commissioning and testing.

1.1.4 Operation and decommissioning

The project is proposed to operate remotely 24 hours a day seven days a week, for at least 30 years. At the end of its life, the project would be decommissioned, involving the removal of all above-ground infrastructure (except for infrastructure associated with the existing Muswellbrook 330 kV substation), in accordance with relevant regulatory requirements. Disturbed areas would be rehabilitated to a condition suitable for rural land use.



Paper Size ISO A4

0 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Muswellbrook Pro Unit Holdings Pty Ltd
McCullys Gap BESS

Project No. **12627183**
Revision No. **2**
Date **14/08/2026**

Project location

FIGURE 1.1

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Print date: 14 Aug 2026 - 11:11

Data source: Santos Public Mapping: HGP data digitised, 2025; Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; NSW_Dedicated_State_Forests: This feature class was created and is maintained by the Forestry Corporation of NSW's Forestry Information and Planning unit.; NPWSReserve: © Department of Finance, Services & Innovation 2018; Nearmap WMS Server: ; Town: ; OpenStreetMap Style: Sources: Map data © OpenStreetMap contributors, Microsoft, Esri Community Maps contributors, Map layer by Esri. Created by: sgoode

1.2 Purpose and scope of this document

This report assesses the potential traffic and transport impacts associated with the construction, operation and decommissioning of the project in accordance with the requirements of the Planning Secretary's Environmental Assessment Requirements (the SEARs), issued on 16 April 2025. The report:

- addresses the relevant SEARs as outlined in Table 1.1
- describes the existing environment with respect to traffic and transport
- assesses the impacts of constructing, operating and decommissioning the project in relation to traffic and transport
- recommends measures to mitigate and manage the impacts identified

Table 1.1 SEARs requirement – traffic and transport

SEARs	Where addressed in this report
Traffic and transport – including:	
An assessment of the peak and average traffic generation, including light vehicles (including shuttle buses), heavy vehicles, heavy vehicles requiring escort, high risk heavy vehicles requiring escort (noting Table 1 in TfNSW Fact Sheet - Transport Management Plans for Over Size and/or Overmass Movements in NSW) and construction worker transportation.	The trip generation characteristics for the construction of the project are detailed in Section 4.2. Operational traffic volumes are detailed in Section 6. Oversize overmass (OSOM) traffic volumes are detailed in Section 5.2.
An assessment of the likely transport impacts to the site access route(s), including the above listed vehicles, site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance, in particular: – the intersection of Sandy Creek Road/New England Highway (A15); and – Muswellbrook Bypass.	An assessment of the potential traffic impacts (including to site access routes and site access points) of the project are provided in Section 5 (construction), Section 6 (operation including decommissioning), and Section 7 (cumulative impacts). The project area does not intersect any Crown land; therefore, no further assessment is required. Analysis of the intersection performance of Sandy Creek Road/New England Highway (A15), accounting for the vehicle activity associated with the Muswellbrook Bypass and other nearby developments, is provided in Section 5.1. Potential impacts to road safety are outlined in Section 5.3.6.
A concept level route analysis required for heavy vehicles requiring escort and high-risk heavy vehicles requiring escort.	The OSOM vehicle route assessment is included in Appendix C and summarised in Section 5.2.
A cumulative impact assessment of traffic from nearby developments (including mining operations); and provide details of measures to mitigate and / or manage potential impacts (developed in consultation with the relevant road authorities) including: – a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), – strategic concept designs of proposed road upgrades (including the site access point); and – road maintenance contributions, and any other traffic control measures.	The cumulative impact assessment is detailed in Section 7 The proposed temporary road works required to accommodate OSOM vehicles are detailed in Section 5.2 and Appendix C. Strategic concept designs of the proposed temporary road intersection works are provided in Appendix D. Road maintenance contributions will be determined post approval in consultation with Muswellbrook Shire Council (Section 7). Traffic control measures will be defined in a Construction Traffic Management Plan as part of the mitigation and management measures for the project (Section 8).

1.3 Report structure and content

The structure and content of this report are outlined in Table 1.2.

Table 1.2 Report structure and content

Section	Description
Section 1 – Introduction	Outlines the key elements of the project, relevant SEARs requirements, and the purpose of this report (this section).
Section 2 – Methodology	Describes the study area and methodology for the assessment.
Section 3 – Existing environment	Describes the existing environmental values of the study area and project area relevant to traffic and transport, including the results of desktop assessments and field investigations.
Section 4 – Basis of assessment	Details the key assumptions on which the assessment has been based.
Section 5 – Construction impacts	Examines the potential for traffic and transport impacts during construction.
Section 6 – Operation and decommissioning impacts	Examines the potential for traffic and transport impacts during operation (including maintenance) and decommissioning.
Section 7 – Cumulative impacts	Provides an assessment of cumulative impacts.
Section 8 – Recommended mitigation and management measures	Recommends measures to mitigate and manage the potential impacts identified.
Section 9 – Conclusion	Provides the key findings of the assessment.

2. Methodology

2.1 Study area

For the purposes of analysis, the study area consists of:

– the project area
– the intersection of New England Highway (A15) and Sandy Creek Road
– Sandy Creek Road between the project area and its intersection with New England Highway (A15).

The OSOM vehicle route between the project area and the Port of Newcastle has also been considered in this assessment.

2.2 Assessment approach

The traffic and transport assessment was undertaken in accordance with the *Guide to Transport Impact Assessment* (Transport for NSW, 2024). The following tasks were undertaken:

– Desktop review:
  - review of the existing conditions of the surrounding transport network, including road network characteristics, intersection operation and the public and active transport network
  - a review of the existing traffic volumes on the New England Highway (A15) and Sandy Creek Road
  - a review of the operation of the rail crossing on Sandy Creek Road
  - a review of planned projects near the project area was undertaken to quantify their construction vehicle activity and inform the impact assessments.
– Data collection:
  - undertake traffic count surveys at the intersection of New England Highway (A15) and Sandy Creek Road.
– Impact assessment:
  - analysis of the New England Highway (A15) and Sandy Creek Road intersection for the current traffic volumes
  - determine the vehicle trips (generation and distribution) during the construction and operational phases of the project
  - model the 2028 horizon year, accounting for the expected project construction traffic volumes and other planned developments in proximity to the project area i.e. cumulative impacts
  - assess the OSOM vehicle routes to and from the project area in accordance with National Heavy Vehicle Regulator (NHVR) approved routes and swept path analysis
  - identify potential impacts on active and public transport as a result of the project
  - recommend measures to mitigate and manage the impacts identified.
– Intersection traffic modelling, using the SIDRA 10 modelling software, has been undertaken for the following two scenarios in the 2028 horizon year:
  - a ‘no-build’ scenario, accounting for background traffic growth and other nearby development
  - a ‘build’ scenario, accounting for background traffic growth, the expected peak construction traffic associated with the project and other nearby developments

2.2.1 Desktop review

A desktop review was undertaken to understand the general characteristics of the study area and supplement site observations. The desktop review utilised publicly available information, including:

– aerial photography by Google Maps/NSW SIX Maps.
– street view images by Google Maps.
– public transport routes and schedules from Transport for NSW Trip Planner (Transport for NSW, n.d.).
– freight rail schedules published by the Australian Rail Track Corporation.
– road crash data published by the Transport for NSW Centre for Road Safety (Transport for NSW, 2025a).
– restricted heavy vehicle routes published by Transport for NSW (Transport for NSW, n.d.).
– a review of other planned/proposed development in proximity to the subject site, as sourced from the NSW Government Planning Portal (refer to Section 2.4).

2.2.2 Data collection

The following traffic surveys were undertaken:

– Intersection count and queue length surveys at the intersection of New England Highway (A15) and Sandy Creek Road on Thursday 5 June 2025 for the following time periods:
  - AM peak – 6 am to 9 am
  - PM peak – 4 pm to 7 pm.

The traffic count data provides an estimate of current traffic volumes on these roads, including separate counts of light and heavy vehicles. This information was used to define the existing (2025) baseline traffic conditions and to identify the peak periods of road network activity for the purposes of this assessment (refer to Section 3.6).

2.2.3 Impact assessment

Construction traffic generation and distribution were estimated for the project on a first principles basis, accounting for the:

– location of the project area
– peak number of workers and expected travel routes
– number of heavy vehicles and expected travel routes
– preliminary construction information and scheduling

Following the determination of baseline traffic volumes in 2025, baseline traffic conditions for a horizon year used in the impact assessment were identified by applying an annual growth factor to 2025 traffic volumes. An annual background growth rate of two per cent has been applied to the through traffic volumes on the New England Highway (A15) to approximate the 2028 background traffic volumes. This growth rate accounts for increases in background traffic on the roads in proximity to the project area but excludes the construction activity associated with other proposed developments in proximity to the project area. The expected vehicle activity associated with other proposed developments in proximity to the project area were identified from their respective EISs, sourced from the NSW Government's Major Project Portal and were also included in the impact assessment so that the assessment accounted for all expected future traffic volumes (refer to Section 2.4).

In accordance with methods outlined in the *Guide to Traffic Management Part 3: Traffic Studies and Analysis Methods* (Austroads, 2020a), a mid-block traffic assessment (refer to Section 2.3.2) was used to assess potential changes to road network operation as a result of the project's construction traffic. The mid-block assessment is based on hourly traffic volumes along the New England Highway (A15) and Sandy Creek Road and lane capacity limits.

Computer modelling software SIDRA 10 was used to assess the peak hour operating performance of the New England Highway (A15) and Sandy Creek Road, considering existing (2025) traffic volumes and estimated future traffic growth, other developments' construction trips (refer to Section 2.4) and the project's construction trips.

Potential impacts on other aspects of the traffic and transport environment, e.g. at road crossings, on local roads and private access points, rail services, parking facilities, public transport, pedestrians and cyclists, etc., were qualitatively assessed by considering how the construction traffic generated by the project would potentially interact with existing infrastructure.

Given the nature of the project and the limited number of operation and maintenance personnel required (up to six staff attending the site on a monthly or quarterly basis), a quantitative assessment was not considered necessary for the operational stage.

2.2.4 Key assumptions

The assessment undertaken adopts a series of assumptions designed to support a robust impact analysis:

- Up to 150 workers will access the project area per day during peak construction conditions.
- The construction contractor would provide shuttle buses to transport workers to and from the project area.
- For the purposes of analysis, it has been assumed that:
  - 60 per cent of construction workers would use shuttle buses (at 25 workers per vehicle).
  - 40 per cent of construction workers would drive (with a car occupancy of 1.2).
- Up to 80 heavy vehicles will access/egress the project area per day. It has been assumed that 10 heavy vehicles would access/egress the project area in a single hour.
- During construction, it is assumed:
  - that 80 per cent of light vehicles will access/egress the project area via the direction of Newcastle, and 20 per cent of light vehicles will access/egress the project area via the north.
  - that 100 per cent of shuttle buses will access/egress the project area via the south.
  - that 90 per cent of heavy vehicles will access/egress the project area via the direction of Newcastle, and 10 per cent of heavy vehicles will access/egress the project area via the north.
- A traffic growth rate of two per cent per annum has been used to determine the background 2028 traffic volumes.
- The project is proposed to operate remotely 24 hours a day, seven days a week, with up to six operational staff required monthly or quarterly to carry out regular maintenance activities.
- The peak construction activity of the nearby four planned/developments (refer to section 2.4) coincides with the construction of the project.
- The construction peak hours of activity (morning and afternoon) will coincide with the road network peak hours.
- The intersection of New England Highway and Sandy Creek Road is in the process of being upgraded which will be upgraded prior to the commencement of the McCullys Gap BESS construction activity.

2.2.5 OSOM assessment

A concept-level OSOM route assessment was undertaken to determine the feasibility of transporting the project transformer (the largest load) from the point of origin to the project area via the existing road network. The assessment was based on an assumed design vehicle representing a conservative transport envelope for the largest anticipated load.

Route development was informed by a desktop review of available OSOM routes, road geometry, key intersections, structures, railway crossings, roadside infrastructure and relevant approval constraints. Swept path analysis was undertaken using AutoTURN at critical turning movements and constrained locations to confirm route feasibility and identify where temporary measures may be required. The assessment was prepared at a concept level to identify a feasible route and principal constraints, with detailed haulage planning, final vehicle confirmation and permitting to occur prior to transport.

2.3 Assessment criteria

2.3.1 Intersection assessment

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. The SIDRA 10 intersection modelling software was used to assess the proposed peak hour operating performance of intersections on the surrounding road network.

The criteria for evaluating the operational performance of intersections are provided by the *Guide to Transport Impact Assessment* (Transport for NSW, 2024) and reproduced in Table 2.1. The criteria for evaluating the operational performance of intersections are based on a qualitative measure (i.e. Level of Service or LoS), which is applied to each band of average vehicle delay.

Table 2.1 Level of Service Criteria for intersections

Level of Service (LoS)	Average Delay per Vehicle (seconds/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity	Near capacity and accident study required.
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control modes.	At capacity, requires other control mode.
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

Source: Guide to Transport Impact Assessment (Transport for NSW, 2024).

2.3.2 Midblock assessment

According to *Guide to Traffic Management, Part 3: Traffic Studies and Analysis* (Austroads, 2020a), the one-way mid-block capacity of an urban arterial road with interrupted flow varies depending on the type of lane. The typical mid-block capacity for urban roads with interrupted flow is outlined in Table 2.2.

Table 2.2 Typical mid-block capacity for urban roads with interrupted flow

Type of lane	One-way mid-block capacity (passenger cars per hour (pc/h))
Median or inner lane	
Divided Road	1000
Undivided Road	
Middle lane (of a 3-lane carriageway)	900
Divided road	900
Undivided road	1000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Source: Table 5.1 in *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads, 2020a).

To account for the different impacts of light and heavy vehicles in the traffic mix, traffic volumes have been converted from 'vehicle units' to 'passenger car units' (pcu) using multipliers called passenger car equivalent (PCE) factors. This allows for the assessment of traffic volumes using one homogenised unit for all vehicle types. A PCE factor of two has been adopted for heavy vehicles to obtain a conservative assessment of the potential impacts of the project, which is consistent with transport planning principles and the criteria provided in the *Traffic Modelling Guidelines* (Transport for NSW, 2013).

An interrupted flow facility road is one in which traffic flow conditions are subject to the influence of fixed elements such as traffic signals, stop signs, give-way signs, roundabouts or other controls that cause traffic to stop periodically, irrespective of the total amount of traffic; examples include urban streets, unsignalised and signalised intersections.

However, *Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis* (section 5.2.1) outlines that:

> *Peak period mid-block traffic volumes may increase to 1200 to 1400 pc/h/lane on any approach road when the following conditions exist or can be implemented:*
>
> – *Adequate flaring at major upstream intersections.*
> – *Uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity.*
> – *Control or absence of crossing or entering traffic at minor intersections by major road priority controls.*
> – *Control or absence of parking.*
> – *Control or absence of right turns by banning turning at difficult intersections.*
> – *High volume flows of traffic from upstream intersections during more than one phase of a signal cycle.*
> – *Good co-ordination of traffic signals along the route.*

For the purposes of this assessment:

– a one-way mid-block capacity of 1,200 pc/h/lane has been adopted for the New England Highway (A15)
– a one-way mid-block capacity of 900 pc/h/lane has been adopted for Sandy Creek Road.

This is in keeping with the Austroads special conditions, which are reflective of the existing conditions for roads in the road network surrounding the project area. This capacity has been used to assess the Volume Capacity Ratio (VCR) of a particular road.

The VCR is a measure of the level of congestion on a road, given the traffic volume and road capacity. When the VCR reaches one, this indicates that the road is operating at 100 per cent capacity.

2.4 Cumulative traffic generation

The *Guide to Transport Impact Assessment* (Transport for NSW, 2024) requires traffic and transport assessments to consider both background traffic growth and other known developments that may affect the network within the same assessment year. To meet this requirement, a review of prospective projects proposing to use Sandy Creek Road was undertaken using publicly available information on the NSW Major Projects website. This review identified the construction-related vehicle activity associated with nearby developments and informed the impact assessment. Currently Sandy Creek Road provides access to several existing land uses, including a correctional facility, a church, an electrical substation and a small number of residential dwellings, with the correctional facility understood to be the primary existing trip generator along the corridor.

Four developments have been identified as potentially relevant to assessing future traffic conditions in 2028, which aligns with the anticipated peak construction period for the project. All four developments are expected to access or egress their sites via Sandy Creek Road. As detailed construction timeframes for these projects are not yet available, this assessment adopts a conservative approach by assuming that peak construction activity for each project overlaps with the McCullys Gap BESS construction period. Data was sourced from the traffic and transport impact assessments held on the NSW Major Projects website for each development and was used to inform the cumulative traffic modelling in this assessment.

2.4.1 Muswellbrook Solar Farm

In May 2025, the NSW Independent Planning Commission approved the Muswellbrook Solar Farm (SSD-46543209). Publicly available information indicates that construction of the Muswellbrook Solar Farm will commence in 2026 and will commence operation in 2028. Therefore, it is likely that construction of the Muswellbrook Solar Farm would overlap with construction of the McCullys Gap BESS project.

The Muswellbrook Solar Farm Traffic Impact Assessment (EMM, 2023) was prepared for the solar farm on a 482-hectare site adjacent to the Muswellbrook Coal Mine. The project consists of:

– a large-scale solar farm
– a BESS
– grid connection and transmission line infrastructure.

Key data included in the Muswellbrook Solar Farm Traffic Impact Assessment is as follows:

– The solar farm and BESS are expected to generate up to 37 peak hour trips at the intersection of New England and Sandy Creek.
– For trip distribution, it was noted that:
  - 80 per cent of construction vehicles travel to the southern section of the site via Muscle Creek Road.
  - 20 per cent of construction vehicles travel to the northern section of the site via Sandy Creek Road.
– SIDRA modelling indicates that the intersections of interest (including New England Highway (A15)/Sandy Creek Road) are expected to operate with a good level of service in 2024, accounting for the development trips and the cumulative impacts from other developments.
– During operation, the project will generate up to seven inbound and seven outbound trips per day.
– A single OSOM vehicle will be required to deliver the transformer to the site.
– Most heavy vehicles are anticipated to travel via Sydney/Newcastle and surrounding regional centres (90 per cent), while some heavy vehicles will also originate from Scone and Aberdeen (10 per cent).
– A level crossing assessment found that coal trains occupy the crossing for an average of 3 minutes 24 seconds, causing queues of up to five eastbound light vehicles on the short section of Sandy Creek Road between the New England Highway (A15) and the crossing.
– During construction, traffic is expected to back up beyond the capacity of this short road section, and mitigation measures are proposed to manage this, including the provision of a right-turn lane.

The development consent includes the following conditions related to vehicle movements:

– The development must not generate more than:
  - 90 heavy vehicle movements a day (a maximum of 13 heavy vehicle movements per hour) during construction, upgrading or decommissioning.
  - 10 light vehicle movements, two shuttle bus movements and two heavy vehicle movements accessing Sandy Creek Road per hour during construction, upgrading or decommissioning.
– The length of vehicles on Sandy Creek Road (excluding heavy vehicles under escort) should not exceed 19 metres.
– Unless otherwise agreed by the Planning Secretary, all heavy vehicles and heavy vehicles requiring escort associated with the development must travel to and from the site via New England Highway (A15) (to and from the south only) and Sandy Creek Road (excluding heavy vehicles requiring escort).

2.4.2 Muswellbrook Battery Energy Storage System

The Muswellbrook BESS (SSD-29704663) project located at 20-24 Sandy Creek Road, was approved by the NSW Government in July 2023. However, construction has not yet commenced, and the development remains in the detailed design and modification approval stage. The development consent includes the following conditions.

A Traffic Impact Assessment (Amber Traffic and Transport Direction, 2022) was prepared for the Muswellbrook BESS and includes the following key data:

- Construction of the BESS is expected to take place over 12 months.
- A maximum of 75 workers will be on-site during construction.
- Access and egress to/from the subject site are proposed via Sandy Creek Road.
- Approximately five OSOM vehicles will be required during the construction of the BESS.
- During peak construction, the site could generate up to 60 heavy and 66 light vehicle movements per day, with 51 vehicle movements during the morning and afternoon peak hours.
- The BESS is expected to be operated by up to two staff members.
- During construction:
  - 90 per cent of workers are expected to access the site from the south, and 10 per cent from the north.
  - 95 per cent of heavy vehicles are expected to access the site from the south, and five per cent from the north.
- The intersection of New England Highway (A15) and Sandy Creek Road is expected to operate with a good level of service during construction.
- A swept path analysis indicates that the existing layout of New England Highway (A15) and Sandy Creek Road can accommodate a simultaneous inbound and outbound manoeuvre of 19-metre articulated vehicles (refer to Figure 2.1).



Source: Muswellbrook Battery Energy Storage System Traffic Impact Assessment

Figure 2.1 19 metre vehicle swept paths at New England Highway (A15) and Sandy Creek Road

2.4.3 New England Highway (A15) Muswellbrook Bypass

The NSW Government is proposing to construct the Muswellbrook Bypass (bypass). The bypass is proposed to provide:

– approximately nine kilometres of new highway with a single travel lane in either direction
– a northern and southern connection with the New England Highway (A15)
– five bridges, including a 367-metre-long bridge over Sandy Creek Road and the railway line.

An update provided by Transport for NSW in March 2025 indicates that:

– early works were carried out in 2023
– utility relocation works are being undertaken in 2025
– tender for the construction work is expected to be issued in 2026, with construction works expected to commence in 2027 and be completed in 2030 (considering an estimated construction duration of three and a half years).

The bypass proposes to provide three construction compounds, including one that will be accessed/egressed via Sandy Creek Road.

Data in the Review of Environmental Factors (AECOM and Transport for NSW, 2021) indicates that construction of the bypass would generate a peak of 300 heavy vehicle movements per day (150 inbound and 150 outbound) and 220 light vehicles per day (110 inbound and 110 outbound), across all compounds.

Subsequent data included in the Addendum Review of Environmental Factors (Transport for NSW, 2025c) indicates that key features of the project include upgrading the intersection of Sandy Creek Road and the New England Highway.

The available data indicates that construction vehicle activity at Sandy Creek Road would consist of 72 vehicle trips in total.

2.4.4 Queensland Hunter Gas Pipeline

The Queensland Hunter Gas Pipeline (MP06_0286) was approved by the NSW Government in 2009 and was made Critical State Significant Infrastructure in 2018 under Clause 5 of Schedule 2 to the Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017. The Traffic Assessment prepared for the environmental assessment (Traffic and Transport Planning Associates, 2008) indicates that:

– The pipeline will involve approximately 175 road crossings and 46 unsealed track crossings.
– Access/egress to a construction site will be via the intersection of the New England Highway (A15) and Sandy Creek Road.
– The project will involve three main components:
  - transportation of pipe
  - construction activities near the road crossings
  - the movement of the workforce between the construction sites and the accommodation facilities.
– The delivery of pipe sections will involve approximately 52 heavy vehicle movements per day.
– The construction activities will require up to (approximately) 600 workers.
– The construction of workers camps would involve approximately 120 semi-trailers delivering accommodation and facilities units.

Information in the environmental assessment indicates that the construction of the pipeline will generate:

– 60 light vehicle trips
– 25 trips per day for water cartage
– three trips per day for fuel deliveries
– two trips per day for camp deliveries and waste disposal
– two trips per day for floating equipment around the construction right of way.

Santos acquired the Queensland Hunter Gas Pipeline in 2022 and are working on finalising the route of the pipeline and its permanent easement. No date for construction is publicly available.

3. Existing environment

3.1 Road network

The project area will be accessed in two locations from Sandy Creek Road. The key intersection that will be used to access/egress the project area is the New England Highway (A15) / Sandy Creek Road intersection. A summary of the key characteristics of these roads are described in further detail below.

3.1.1 Road characteristics

New England Highway (A15)

New England Highway (A15) (refer to Figure 3.1) is a state/arterial road that runs in a north/south direction and connects Yarraman in Queensland to Hexham in NSW. The road is owned and controlled by Transport for NSW.

Key features of the New England Highway (A15) in proximity to the project area are summarised in Table 3.1.

Table 3.1 New England Highway (A15) key features

Feature	Description
Carriageway	A sealed carriageway line marked carriageway with a single travel lane in either direction. The New England Highway (A15) provides travel lanes of 3.5 metres and shoulders of approximately two to three metres. At the Sandy Creek Road intersection, the New England Highway (A15) includes an auxiliary right lane allowing northbound through-traffic to bypass queued right-turning vehicles.
Parking	On-street parking is not permitted along both sides of the road.
Speed limit	60 km/h in Muswellbrook. 100 km/h outside population centres.
Active transport facilities	No dedicated active transport facilities are provided. Advanced cyclists can ride on the road shoulders.
Public transport	Several school bus services operate along the highway, i.e. S831, S829.
Heavy vehicles	The NHVR designates New England Highway (A15) as an approved 26 m B-double and OSOM route.



Source: Google Street View (image taken January 2025)

Figure 3.1 New England Highway (A15) looking north to Sandy Creek Road

At its intersection with Sandy Creek Road, the New England Highway (A15) provides an auxiliary right lane (AUR) whereby northbound vehicles on the New England Highway (A15) can manoeuvre around vehicles queuing to turn right into Sandy Creek Road, as shown in Figure 3.2.



Paper Size ISO A4

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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New England Highway / Sandy Creek Road intersection

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FIGURE 3.2

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Data source: Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; Nearmap imagery extracted 20241112 Railway: Nearmap WMS Server: .
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Sandy Creek Road

Sandy Creek Road (refer to Figure 3.3) is a local road that runs in an east/west direction and connects McCullys Gap with Muswellbrook. Sandy Creek Road is a local (unclassified) road owned and controlled by Muswellbrook Shire Council.

Additionally:

– Sandy Creek provides access to a correctional facility, a church, an electrical substation and a small number of dwellings
– As detailed in section 7, a number of developments are proposed on Sandy Creek Road.

The key features of Sandy Creek Road are summarised in Table 3.2.

Table 3.2 Sandy Creek Road key features

Feature	Description
Carriageway	A sealed line marked carriageway width of approximately six metres and a single travel lane in either direction.
Parking	On-street parking is not permitted along either side of the road.
Speed limit	Typically, 100 km/h, 60 km/h in proximity to the New England Highway (A15).
Active transport facilities	No active transport facilities are provided.
Public transport	School bus services traverse Sandy Creek Road, with a number of bus stops provided along its length.
Heavy vehicles	The NHVR designates Sandy Creek Road as an approved 19 m B-double and OSOM route with restrictions applicable between peak periods of school activity.

As shown in Figure 3.3, a rail crossing with signage and warning lights is provided across Sandy Creek Road, approximately 45 metres to the east of the New England Highway (A15).



Source: Google Street View (image taken January 2025)

Figure 3.3 Sandy Creek Road looking east from the New England Highway (A15)

Information provided by the Australian Rail Track Corporation indicates that they are planning to upgrade the level crossing with the provision of boom gates within the next two years as part of the Australian Government's Regional Level Crossing Upgrade Fund.

The provision of boom gates will provide improved safety outcomes for vehicles traversing Sandy Creek Road.

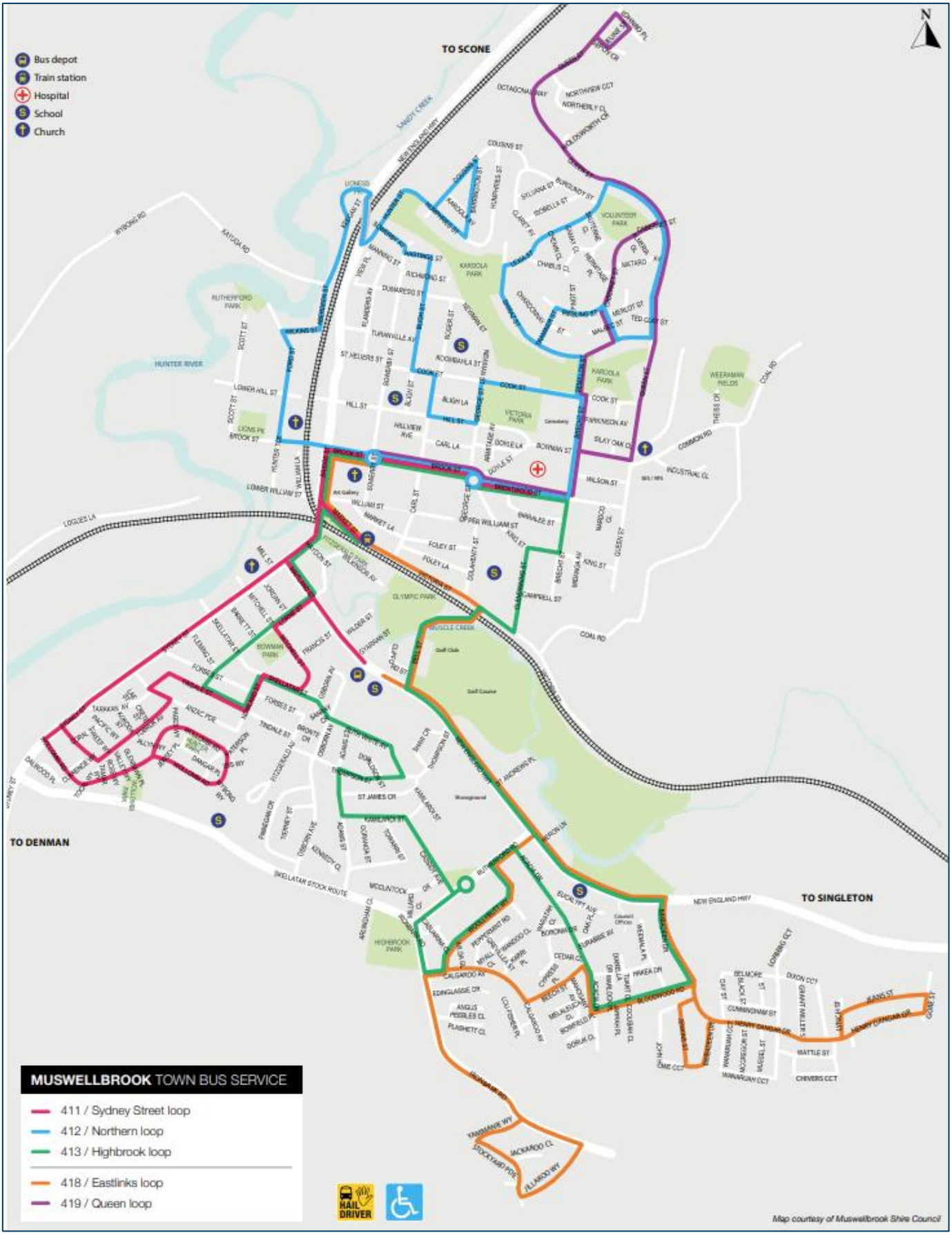
3.2 Public transport

A summary of the public transport services operating in the general proximity to the project area is described below.

3.2.1 Bus services

There are no public bus stops on the New England Highway (A15) in proximity to Sandy Creek Road. Osborn's Transport provides the following local bus services within Muswellbrook (refer to Figure 3.4):

- 411: Muswellbrook Town Centre to Sydney St (Loop Service) – four weekday services and three weekend services.
- 412: Muswellbrook Town Centre to Muswellbrook North (Loop Service) – four weekday services and three weekend services.
- 413: Muswellbrook Town Centre to Highbrook (Loop Service) – five weekday services and three weekend services.
- 418: Muswellbrook Town Centre to Muswellbrook Eastlinks (Loop Service) – four weekday services and three weekend services.
- 419: Muswellbrook Town Centre to Queen Street (Loop Service) – four weekday services and three weekend services.



Source: Osborn's Transport (2025)

Figure 3.4 Muswellbrook local bus services

In addition, Osborn's Transport provides the following regional bus services.

– 414: Muswellbrook to Scone via Aberdeen (Loop Service) – four weekday services
– 415: Muswellbrook to Denman (Loop Service) – four weekday services.

The school bus service that operates on Sandy Creek Road is as follows:

– S830: McCullys Gap to Aberdeen Schools via Muswellbrook Schools during NSW school term weekdays only, with one morning and one afternoon service.

A number of other school buses operate within Muswellbrook that traverse sections of the New England Highway (A15), these include:

– S829: Dartbrook to Muswellbrook Schools via Aberdeen Schools
– S831: Muswellbrook to Scone Schools via Aberdeen Schools
– S833: Singleton to Scone Schools via Muswellbrook & Aberdeen
– S834: Muswellbrook to Muswellbrook Schools and Aberdeen Schools via Wollombi Road
– S842: South Muswellbrook to Muswellbrook Schools via Ironbark and Wollombi Road
– S844: Denman to Muswellbrook Schools via Wollombi Loop and Bimbadeen Drive.

3.2.2 Rail services

The following commuter rail services operate at Muswellbrook Station:

– Hunter Line (HUN) – Scone to Newcastle:
  - Departs Muswellbrook Station at 6.25 am, 10.09 am, 7.23 pm and 9.09 pm (Monday to Friday)
  - Departs Muswellbrook Station at 6.56 am and 9.05 pm (weekends and public holidays)
– Hunter Line (HUN) – Newcastle to Scone:
  - Departs Muswellbrook Station at 5.02 am, 9.50 am, 6.05 pm and 7.35 pm (Monday to Friday)
  - Departs Muswellbrook Station at 5.39 am and 7.28 pm (weekends and public holidays)
– 223: Central Station to Armidale Station – departs Muswellbrook Station at 1.16 pm
– 224: Armidale Station to Central Station – departs Muswellbrook Station at 12.48 pm.

3.2.3 Freight services

In addition to commuter services, freight, grain, and coal trains also traverse the rail line on Sandy Creek Road. Information in the Muswellbrook Solar Farm Traffic Impact Assessment (EMM, 2023) indicates that:

– Approximately 53 to 59 trains traverse the rail crossing on Sandy Creek Road per day, over a 24-hour period.
– In the AM peak (8 am to 9 am), there are three train movements that will stop vehicular traffic at the level crossing.
– In the PM peak (3.30 pm to 4.30 pm), there are two train movements that block the level crossing.
– The coal trains that passed through the level crossing were observed to occupy the level crossing for an average time of three minutes and 24 seconds. This includes a warning time at an average time of one minute and 16 seconds, followed by the train occupying the level crossing at an average time of two minutes and eight seconds.
– During the time of the level crossing closure, queues of up to five light vehicles were observed going eastbound on the short stretch of Sandy Creek Road between the New England Highway (A15) and the Sandy Creek Road intersection and the level crossing.

3.3 Active transport

Footpaths and pedestrian crossings are provided on the New England Highway (A15) within the Muswellbrook Township. However, there are no cycle paths, dedicated footpaths or pedestrian crossings provided in the vicinity of the project area.

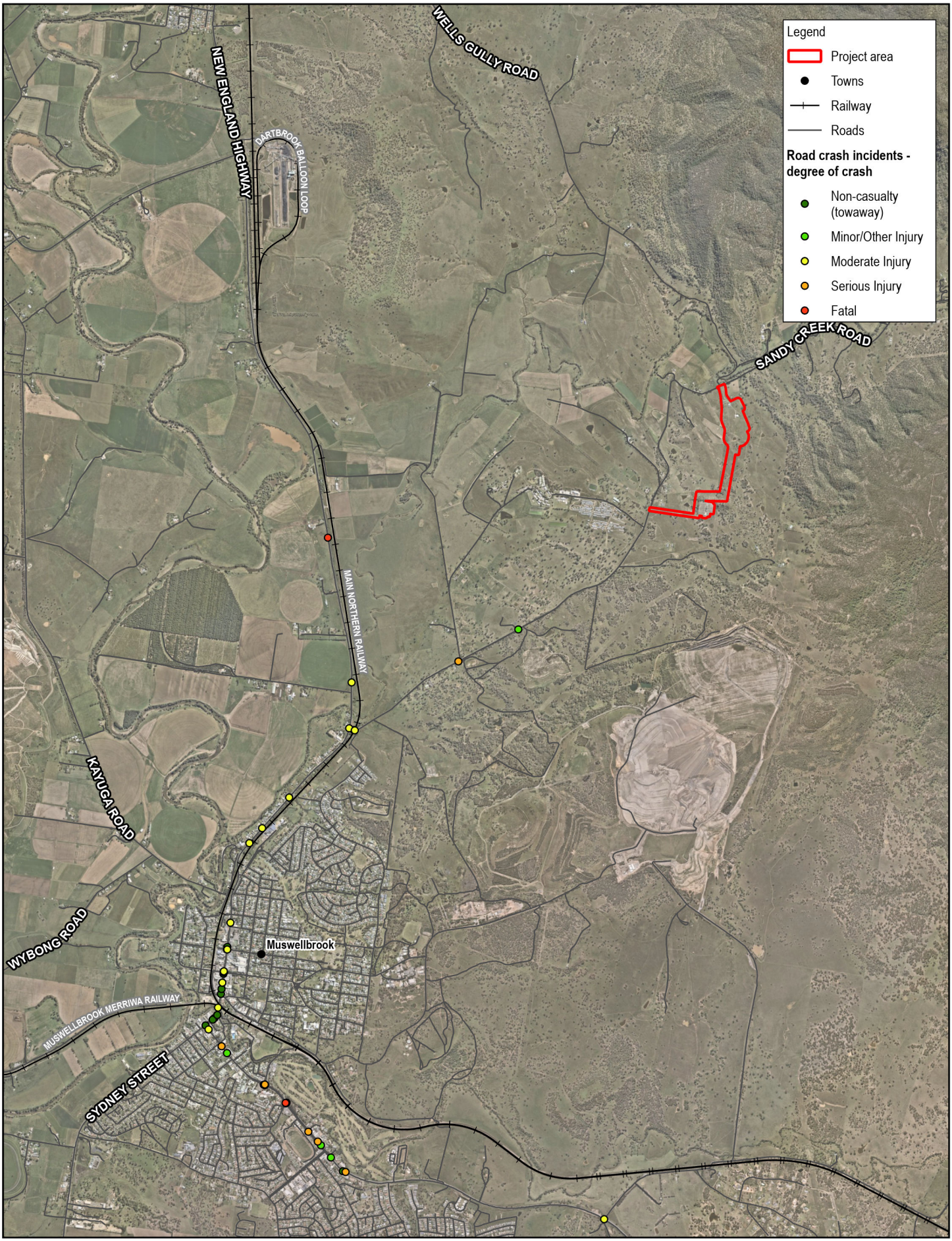
Transport for NSW designates some sections of the New England Highway (A15) as a “road shoulder” bike path. However, these paths are not physically separated from vehicle traffic and are only expected to be used by experienced cyclists.

3.4 Crash data

Road crash information in the vicinity of the study area was obtained from the most recent crash statistics published by the Transport for NSW Centre for Road Safety over a five-year period, between 2020 and 2024 (Transport for NSW, 2025a). The location of the crashes is shown in Figure 3.5.

Analysis of the data indicates the following:

- Six crashes occurred within 500 metres (approximately) of the intersection of New England Highway (A15) and Sandy Creek Road:
  - Four involved rear-end collisions between two vehicles, three crashes resulted in moderate injuries, and one was “non-casualty”.
  - Two involved vehicles driving off the road, one crash resulted in moderate injuries, and one was “non-casualty”.
- The crash to the north of Sandy Creek Road involved a vehicle driving off the road and resulted in a moderate injury.
- The crash on Sandy Creek Road involved a driver losing control of their vehicle and resulted in a minor injury.



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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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Road crash incidents 2020 – 2024

FIGURE 3.5

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Data source: Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; Nearmap imagery extracted 20241112 Railway: Roads: Nearmap WMS Server: . Created by: epangan

3.5 Heavy vehicles

3.5.1 Heavy vehicle types

The National Heavy Vehicle Regulator (NHVR) is responsible for administering the *Heavy Vehicle National Law* across Australia. The Heavy Vehicle National Law regulates the use of heavy vehicles on roads to ensure that roads remain safe for all road users, protect road infrastructure, and ensure that goods and passengers are transported efficiently. To do this, heavy vehicles are classified depending on their mass, size, configuration, or a combination of these in accordance with the Heavy Vehicle (Mass, Dimension and Loading) National Regulation (Heavy Vehicle Regulation).

A Restricted Access Vehicle is defined as any single motor vehicle or combination with a combined load that exceeds the general access overall dimensions as defined in the Heavy Vehicle Regulation.

The NHVR refers to OSOM vehicles, which are a type of Restricted Access Vehicle (RAV), as 'Class 1 load carrying vehicles', defined as:

– vehicle and its load exceeding the prescribed mass or dimension requirements
– carrying a designed-for-purpose or large indivisible item.

A separate category of OSOM, known as high risk OSOMs, are defined as vehicles that:

– exceed certain dimensions, i.e. longer than 40 metres and six metres wide
– travel on high-risk routes
– carry sensitive loads, i.e. radiation, etc.

3.5.2 Heavy vehicle routes

The NHVR provides interactive maps identifying which roads are already permitted for RAV and high risk OSOM vehicles.

Restricted access vehicles

The 25/26 metre B-Double route in proximity to the project area is shown in Figure 3.6.

Figure 3.6 indicates that the New England Highway and other arterial roads in proximity to the project area are authorised to accommodate 25m/26m B-doubles.

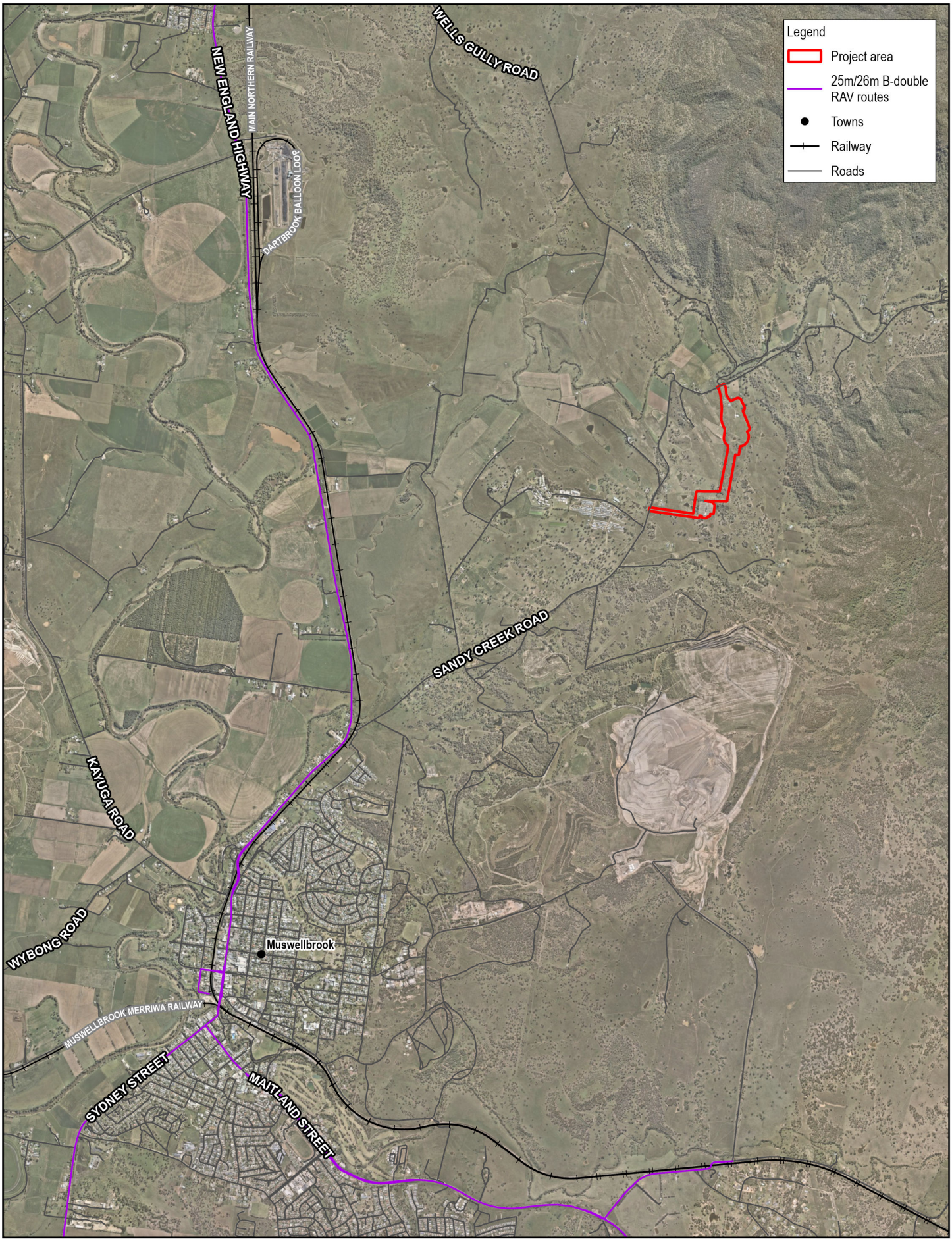
The RAV maps also indicate that Sandy Creek Road is authorised to accommodate 19-metre B-doubles that exceed GAV mass limits. However, RAV vehicles are not permitted to travel on Sandy Creek Road between 7.30am and 8.30am and 3.45pm and 4.45pm on school days. Sandy Creek Road is not currently approved for 25m/26m B-doubles.

OSOMs

Approved OSOM vehicle routes in proximity to the project area are shown in Figure 3.7.

Figure 3.7 indicates that the New England Highway (A15) and other arterial roads in proximity to the project area are authorised to accommodate OSOM vehicles.

It is noted that a section of the New England Highway (A15) within Muswellbrook, between Maitland Road and Market Street, is restricted to vehicles that do not exceed a width of 4.6 metres, a height of 5 metres, and a length of 30 metres. These restrictions are associated with the underpass of a rail bridge within Muswellbrook which prohibits the movement of vehicles larger than this.



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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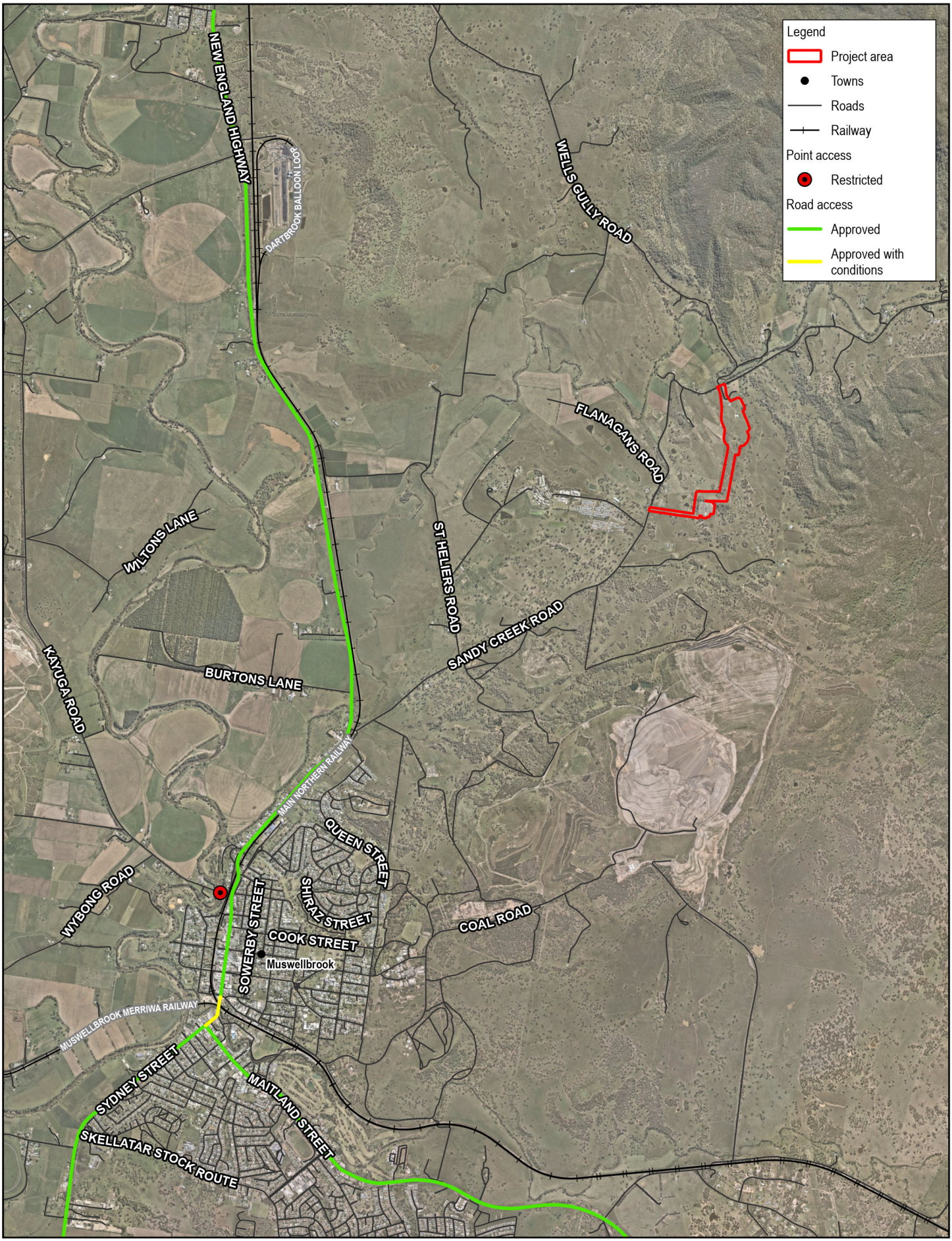
Project No. **12627183**
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25m/26m B-double RAV routes

FIGURE 3.6

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Data source: Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; Nearmap imagery extracted 20241112 Railway: Roads: Nearmap WMS Server: . Created by: epangan



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OSOM vehicle routes

FIGURE 3.7

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Data source: Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; Nearmap imagery extracted 20241112 Railway: Nearmap WMS Server: .
Created by: epangan

3.6 Existing traffic volumes

To identify the existing traffic conditions in proximity to the project area, weekday AM and PM peak period traffic counts were undertaken on Thursday, 5 June 2025, at the intersection of New England Highway (A15) and Sandy Creek Road.

The traffic counts were undertaken in 15-minute intervals for the following times to coincide with peak periods of road network activity:

– 6 am to 9 am
– 4 pm to 7 pm

The observed traffic network peak hours were identified as:

– Morning peak: 8 am to 9 am
– Afternoon peak: 4 pm to 5 pm

The existing peak hour traffic flows are shown in Figure 3.8.

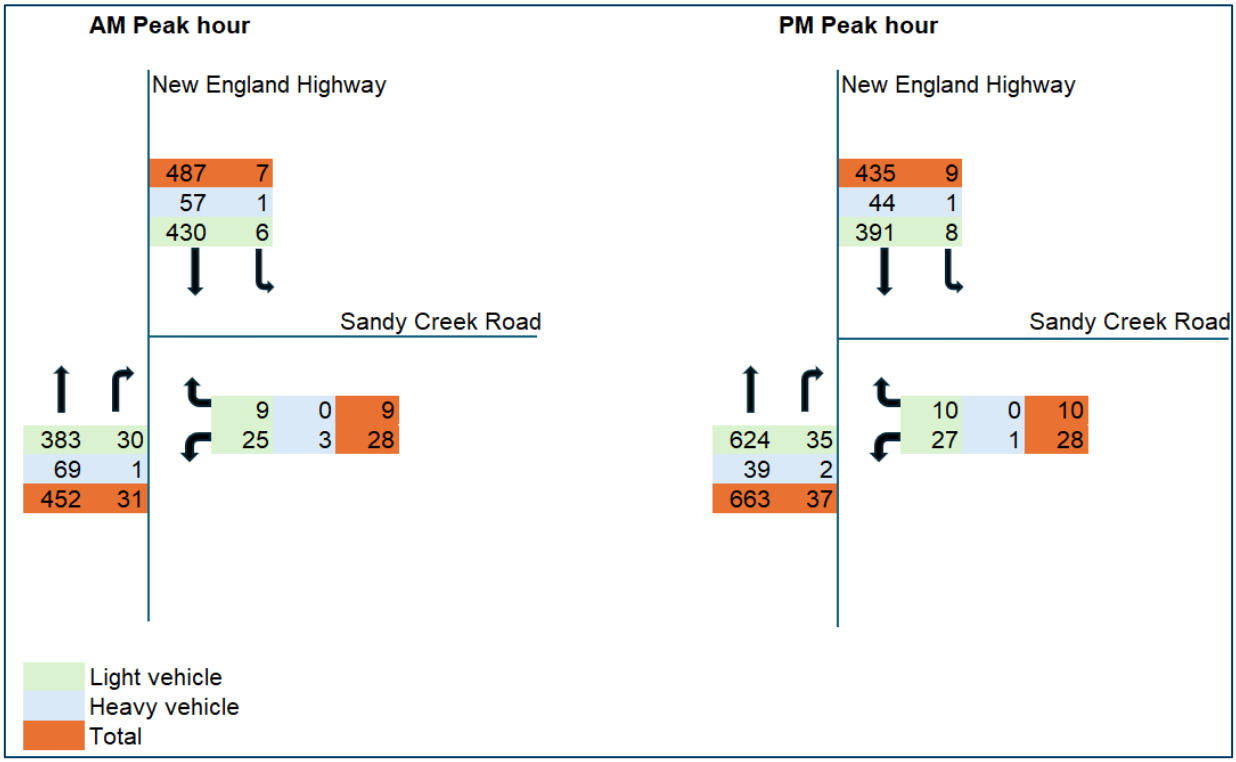


Figure 3.8 Current peak hour traffic volumes (2025)

The data in Figure 3.8 indicates that:

– In the AM peak hour, northbound and southbound traffic volumes are approximately equivalent.
– In the PM peak hour, northbound traffic volumes are higher than southbound traffic volumes.
– The majority of vehicles access/egress Sandy Creek Road to and from the south in the AM and PM peak hours.

It is assumed that the majority of vehicles on Sandy Creek Road are associated with the correctional facility and therefore do not traverse Sandy Creek Road in proximity to the project area.

Detailed traffic survey data is provided in Appendix A.

3.7 Road network performance

3.7.1 Intersection performance

As detailed in Section 2.4.3, as part of the bypass project, it is proposed to upgrade the intersection of Sandy Creek Road and the New England Highway. Design drawings of the proposed intersection upgrade provided by Transport for NSW and reviewed by the project indicated that:

– the current Auxiliary Right-Turn (AUR) lane will be upgraded to a Channelised Right-Turn (CHR) lane.
– an Auxiliary Left-Turn (AUL) lane will be provided, noting that a left turn lane is not currently provided at the intersection.
– the right-turn lane will have a length of approximately 125 metres, while the left-turn lane will have a length of approximately 90 metres.

Consistent with Austroads guidance, CHR treatments generally provide superior safety performance to AUR treatments and are preferred where traffic volumes and operating conditions warrant a higher-order treatment. This will improve intersection safety by providing a dedicated and physically separated right-turn lane, thereby reducing rear-end and overtaking-related crash risk, improving driver guidance and expectancy, and providing greater protection for vehicles decelerating and waiting to turn.

Further, the provision of an AUL will enhance both the safety and operational performance of the intersection by removing decelerating left-turning vehicles from the through traffic stream. This reduces the potential for rear-end crashes, improves traffic flow on the major road, and provides additional capacity to accommodate future traffic growth. Additionally, the proposed layout provides additional storage, compared to the current situation, for vehicles turning into Sandy Creek from the New England Highway.

Consultation with Transport for NSW confirms that it is expected that the upgrade will be completed by the end of 2026. Accordingly, the proposed intersection upgrade has been used as the basis for the existing conditions assessment.

The layout of the intersection of New England Highway/Sandy Creek Road, as modelled in SIDRA, is displayed in Figure 3.9.

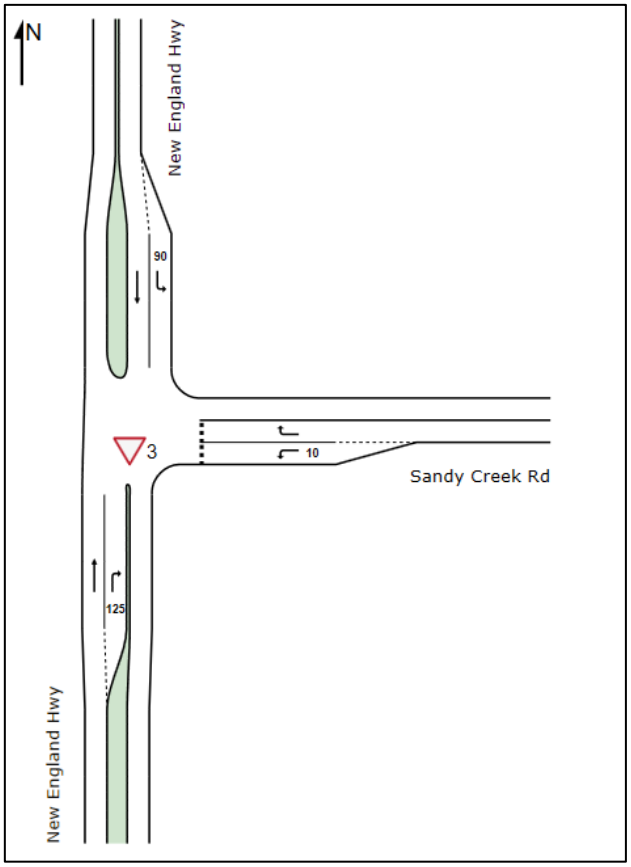


Figure 3.9 Upgraded New England Highway/Sandy Creek Road SIDRA configuration

The SIDRA outputs for the current traffic volumes (refer to Figure 3.8) and the intersection geometry displayed in Figure 3.9 are shown in Table 3.3

Table 3.3 New England Highway (A15)/Sandy Creek Road intersection performance (2025)

Intersection leg	AM Peak			PM Peak		
	Av Delay (sec)	LoS	95th % Queue (m)	Av Delay (sec)	LoS	95th % Queue (m)
New England Highway (A15) – south	1	A	1	1	A	1
Sandy Creek Road	10	A	1	12	A	2
New England Highway (A15) – north	0	A	0	0	A	0
All vehicles	**1**	**A**	**-**	**1**	**A**	**-**

The SIDRA outputs in Table 3.3 indicate that the New England Highway (A15)/Sandy Creek Road intersection will operate at a good level of capacity (LoS A) during peak periods of road network activity.

3.7.2 Mid-block performance

Table 3.4 presents the VCR of the key roads in the study area during the peak hour in accordance with the outputs of the traffic surveys and the criteria in Section 2.3.2.

Table 3.4 Peak hour mid-block VCR – base case 2025

Intersection leg	Direction	Number of lanes	Capacity per lane[1]	Existing traffic (2025) (pcu)		Volume capacity ratio (2025)	
				AM Peak	PM Peak	AM Peak	PM Peak
New England Highway (A15) – North	Northbound	1	1,200	530	712	0.44	0.59
	Southbound	1	1,200	552	489	0.46	0.41
New England Highway (A15) – South	Northbound	1	1,200	553	741	0.46	0.62
	Southbound	1	1,200	575	508	0.48	0.42
Sandy Creek Road	Eastbound	1	900	40	49	0.04	0.05
	Westbound	1	900	40	39	0.04	0.04

Notes: 1. Table 6.1 *Guide to Traffic Management Part 3 – Traffic Studies and Analysis Methods* (Austroads, 2020a).
2. 1 light vehicle = 1 pcu, 1 heavy vehicle = 2 pcu.

The data in Table 3.4 indicates that the key roads in the study area operate with traffic volumes well below their maximum capacity in peak hours and, therefore, throughout the rest of the day also.

4. Basis of assessment

4.1 Construction activities

4.1.1 Overview

Subject to regulatory approvals, construction would commence in 2027 and is expected to take about 18 months to complete.

Construction is expected to be undertaken in four periods:

– Site establishment would take about a month.
– Main construction works would take about 13 months, with an indicative peak construction period of four to six months.
– Commissioning would take about three months.
– Reinstatement and rehabilitation would take about a month.

The project is expected to be operational in 2029 following commissioning, testing and demobilisation.

Further information about the project, including the proposed infrastructure, indicative construction methods, working hours and land requirements, is provided in chapter 3 (Project description) of the EIS.

Key aspects of the construction methodology that are relevant to the traffic assessment are outlined in the following sections.

4.1.2 Project area access and access tracks

The proposed access points to the project area will be via 380 Sandy Creek Road and 578 Sandy Creek Road, located off the New England Highway (A15), approximately nine kilometres north of Muswellbrook. Vehicles are expected to use Sandy Creek Road and then unsealed private tracks for entry and exit to the project area.

The existing access tracks off 578 and 380 Sandy Creek Road to the proposed BESS compound and the Muswellbrook 330 kV substation, respectively, would be utilised for use during construction, operation and maintenance. The primary site access point at 578 Sandy Creek Road would undergo temporary road works to enable heavy vehicle access (including ‘high risk’ OSOMs). A new internal access track would be constructed to enable access to the BESS compound and project substation compound during construction and operation.

Temporary road works would include widening and placing hardstand to enable safe and sustainable use of the intersection at the project area by OSOM vehicles (refer to Section 4.1.4). Short sections of new access tracks to the transmission support structures would be constructed to facilitate construction activities and maintenance access once operational. These shorter access tracks would be constructed from the closest access points on the existing access track off Sandy Creek Road to the BESS compound and the existing access track to the Muswellbrook 330 kV substation.

4.1.3 Workforce

It is anticipated that a peak of up to 150 construction staff would be required during construction; however, at times this number could be less, depending on the works being completed. The construction workforce would be sourced from the local area as far as practicable. Worker parking would be provided at the project area.

4.1.4 Road intersection works

A concept level route assessment for the movement of OSOM vehicles between the Port of Newcastle and the project area, via New England Highway (A15) and Golden Highway (B84) was undertaken to provide guidance on issues and risks for this report (refer to Appendix C). The OSOM route identified aligns with EnergyCo's Port to Renewable Energy Zones transport corridor, in which intersection upgrades are being undertaken to facilitate the safe and efficient movement of heavy and oversized materials to the REZ. As a result, only a small number of localised and temporary works are required to accommodate OSOM deliveries and limited to local roads used to access the project area.

The locations where temporary works would be required are at:

– New England Highway / Sandy Creek Road (turning left, approaching from the north)
– Site access at 578 Sandy Creek Road

The detailed scope of works required at these locations, together with final route confirmation, traffic management and construction staging requirements, would be determined during detailed OSOM route assessment and construction planning, in consultation with the relevant road authorities, NHVR and the transport logistics company.

4.2 Construction trip generation

4.2.1 Workers transport

For the purposes of analysis, it has been assumed that:

– an average of 40 workers would access/egress the project area per day.
– up to 150 workers would access/egress the project area per day during peak construction conditions.
– 40 per cent of construction workers would live in townships in proximity to the subject site (i.e. Scone, Muswellbrook and Singleton) and drive (with a car occupancy of 1.2), i.e. one in five light vehicles would have a driver and a passenger.
– 60 per cent of construction workers would be "non locals" and would use shuttle buses (at 25 workers per vehicle).
– the non local workers are expected to reside in temporary accommodation facilities (motels and hotels).
– the shuttle buses and light vehicles would access and egress the project area in the morning and afternoon road network peak periods.

Based on these assumptions, the movement of workers to and from the project area is expected to generate up to 58 trips in peak hours as follows:

– AM peak hour:
  - four inbound and four outbound shuttle buses
  - 50 inbound light vehicles
– PM peak hour
  - four inbound and four outbound shuttle buses
  - 50 outbound light vehicles

4.2.2 Heavy vehicles

In summary:

– An average of 24 heavy vehicles will access/egress the project area per day.
– Up to 80 heavy vehicles will access/egress the project area during the peak construction period per day.
– Construction activity would typically occur between 7am and 6pm on weekdays and between 8 am and 1 pm on Saturdays, with occasional heavy vehicle movements outside these times.
– On average, this equates to approximately five heavy vehicles accessing/egressing the project area per hour.

– To be conservative, it has been assumed that 10 heavy vehicles would access/egress the project area in a single hour.

Table 4.1 summarises the peak vehicle trips generated during the construction period for the project.

Table 4.1 Traffic generation during peak construction periods

Vehicle type	AM Peak		PM Peak	
	Inbound	Outbound	Inbound	Outbound
Light vehicle (car / 4WD)	50			50
Shuttle bus	4	4	4	4
Heavy vehicles	10	10	10	10
Total	64	14	14	64

Accordingly, the project is expected to generate up to approximately 78 vehicle trips during the morning and evening peak hours.

For the purposes of analysis, shuttle buses have been designated as heavy vehicles.

4.3 Construction trip distribution

For the purposes of analysis, it has been assumed that:

– Light vehicles:
  - 80 per cent of workers will access/egress the project area to and from the south, i.e. from Muswellbrook, Singleton and Newcastle.
  - 20 per cent of workers will access/egress the project area to and from the north, i.e. from Tamworth and Scone.
– Shuttle buses: 100 per cent of workers will access/egress the project area to and from the south
– Heavy vehicles:
  - 90 per cent of heavy vehicles are expected to access the project area to and from the south, i.e. via Muswellbrook, Newcastle and Sydney.
  - 10 per cent of heavy vehicles are expected to access the project area to and from the north, i.e. via Scone and Aberdeen.

These assumptions are consistent with the relative size of the key population centres in general proximity to the project area and the data from the nearby approved Muswellbrook BESS Traffic Impact Assessment (Amber Traffic and Transport Direction, 2022) and Muswellbrook Solar Farm Traffic Impact Assessment (EMM, 2023).

In accordance with the trip generation data detailed in Section 4.2 and the trip distribution assumptions detailed above, the project peak hour construction vehicle activity is shown in Figure 4.1.

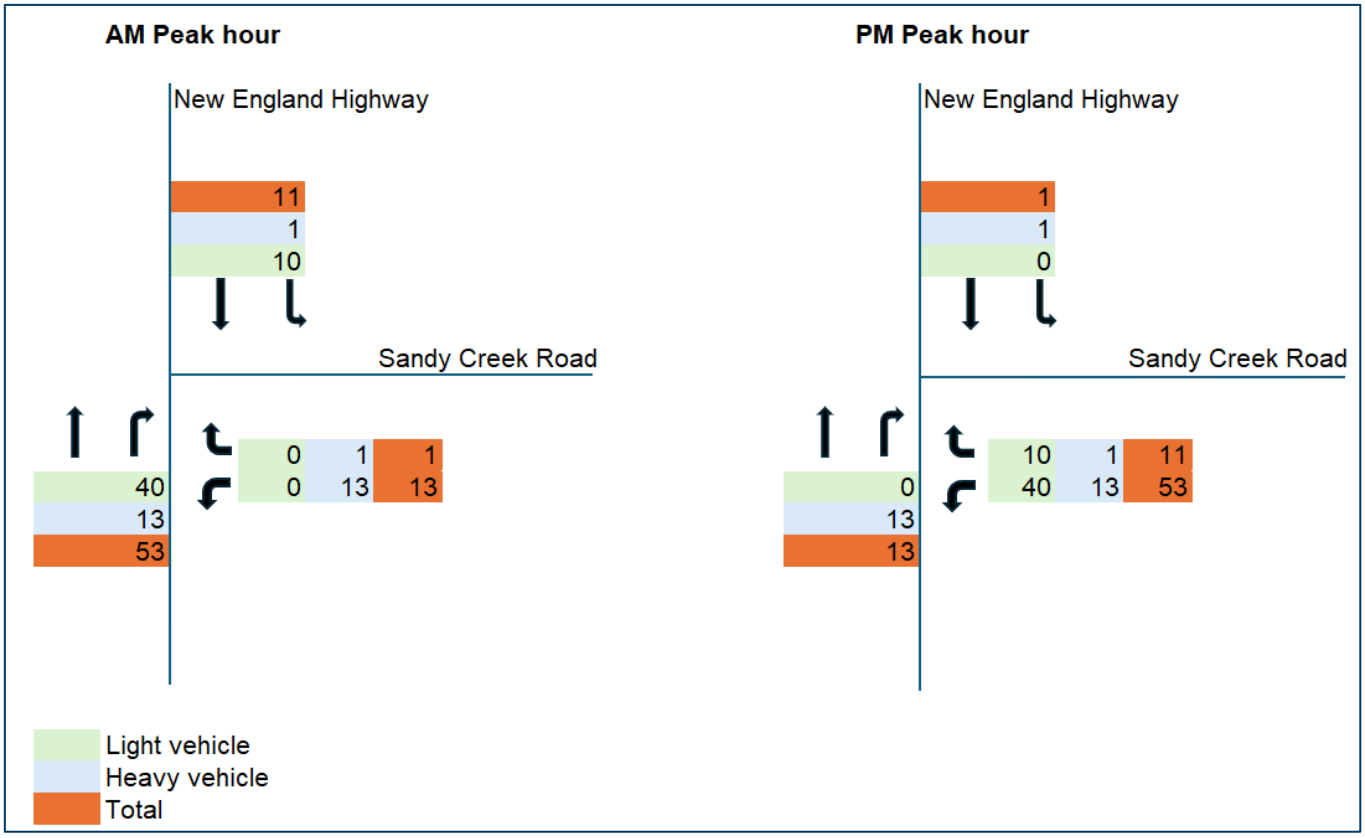


Figure 4.1 Construction peak hour traffic volumes

4.4 Growth rate

A Transport for NSW count station (station id: T6158N) is located on the New England Highway (A15), approximately seven kilometres north of Sandy Creek Road. The average weekday traffic volumes between 2022 and 2025 are as follows (Transport for NSW, 2025b):

- 2022 – 11,404 vehicles
- 2023 – 11,681 vehicles
- 2024 – 11,762 vehicles
- 2025 – 12,168 vehicles

The data indicates that between 2022 and 2025, the average weekday traffic volumes on the New England Highway (A15) grew by approximately seven per cent, over four years at an average of less than two per cent per year.

For the purposes of analysis, a conservative annual background growth rate of two per cent per year has been applied to the through traffic volumes on the New England Highway (A15).

4.5 Construction traffic volumes

4.5.1 Introduction

Intersection traffic modelling, using the SIDRA 10 modelling software, has been undertaken for the following two scenarios in the 2028 horizon year:

– A ‘no-build’ scenario, accounting for background traffic growth and other nearby developments (excluding the project).
– A ‘build’ scenario, accounting for the background traffic growth, other nearby developments and the expected peak construction traffic associated with the project.

4.5.2 No build scenario

As detailed in Sections 2.2 and 2.4, the traffic generation associated with other proposed developments in proximity to the project area has been used to develop the likely background traffic volumes.

A summary of the trips associated with the other proposed developments is shown in Figure 4.2.

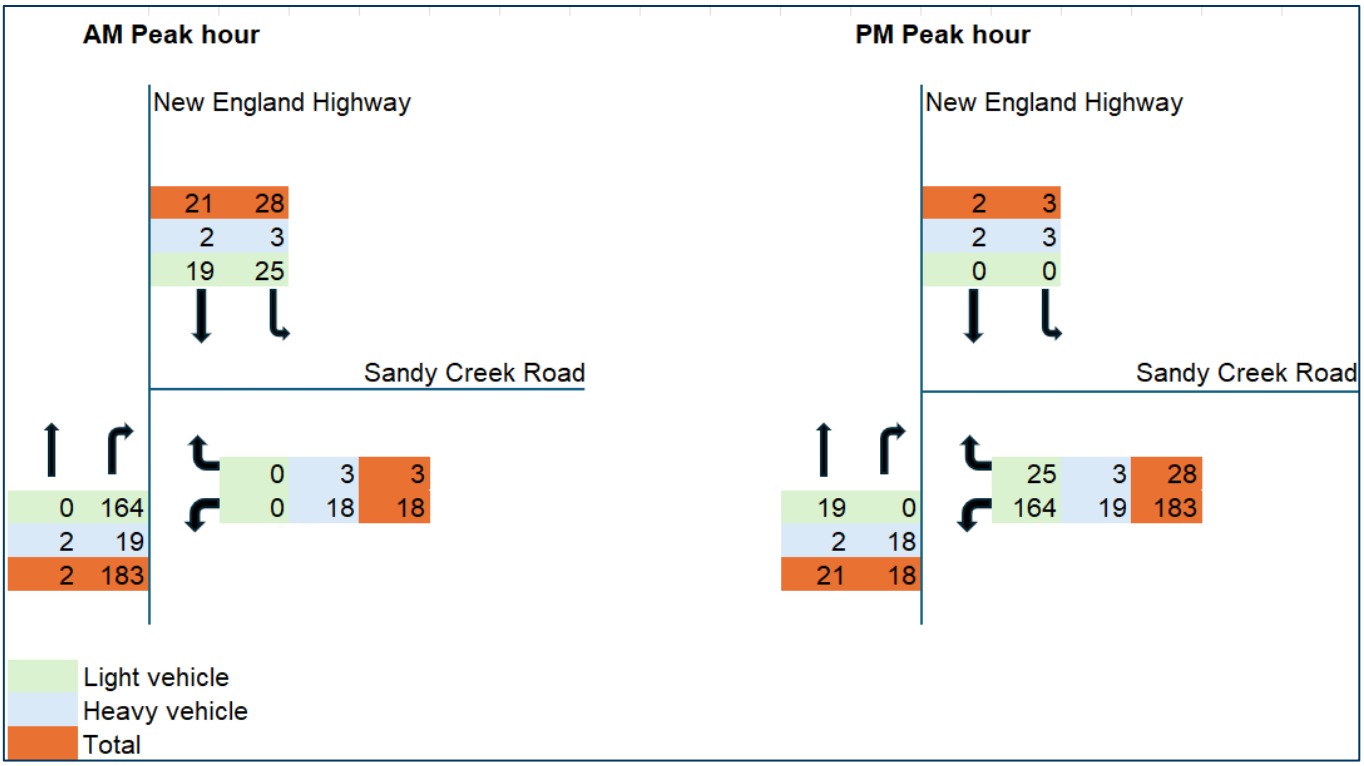


Figure 4.2 Other development vehicle trips (2028)

The “no build” traffic volumes including a two per cent annual growth rate for the New England Highway (A15) and the other development vehicle trips (refer to Figure 4.2) are shown in Figure 4.3.

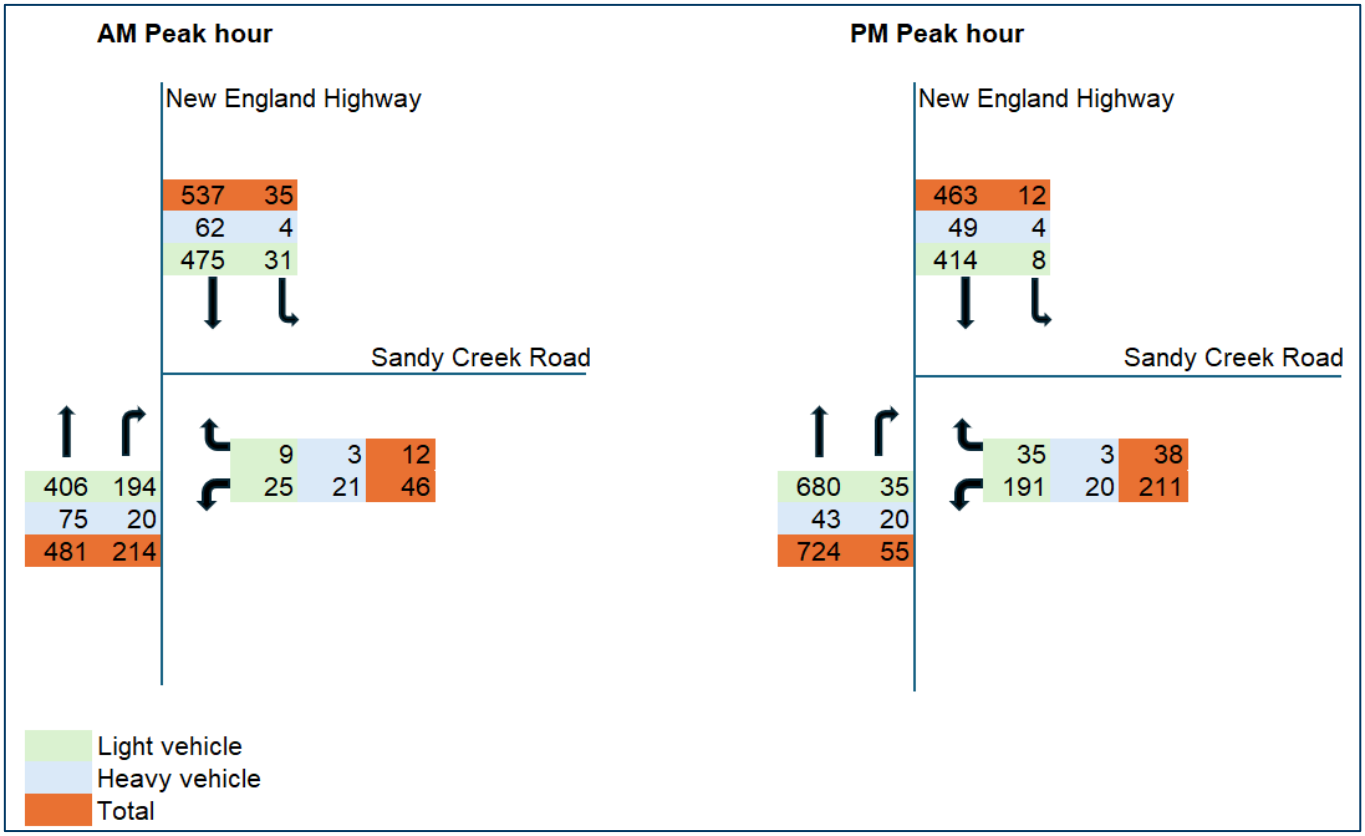


Figure 4.3 No build traffic volumes (2028)

4.5.3 Build scenario

The “build” traffic volumes, accounting for the “no build” traffic volumes (refer to Figure 4.3) and the project’s peak hour vehicle activity (refer to Figure 4.1), are shown in Figure 4.4.

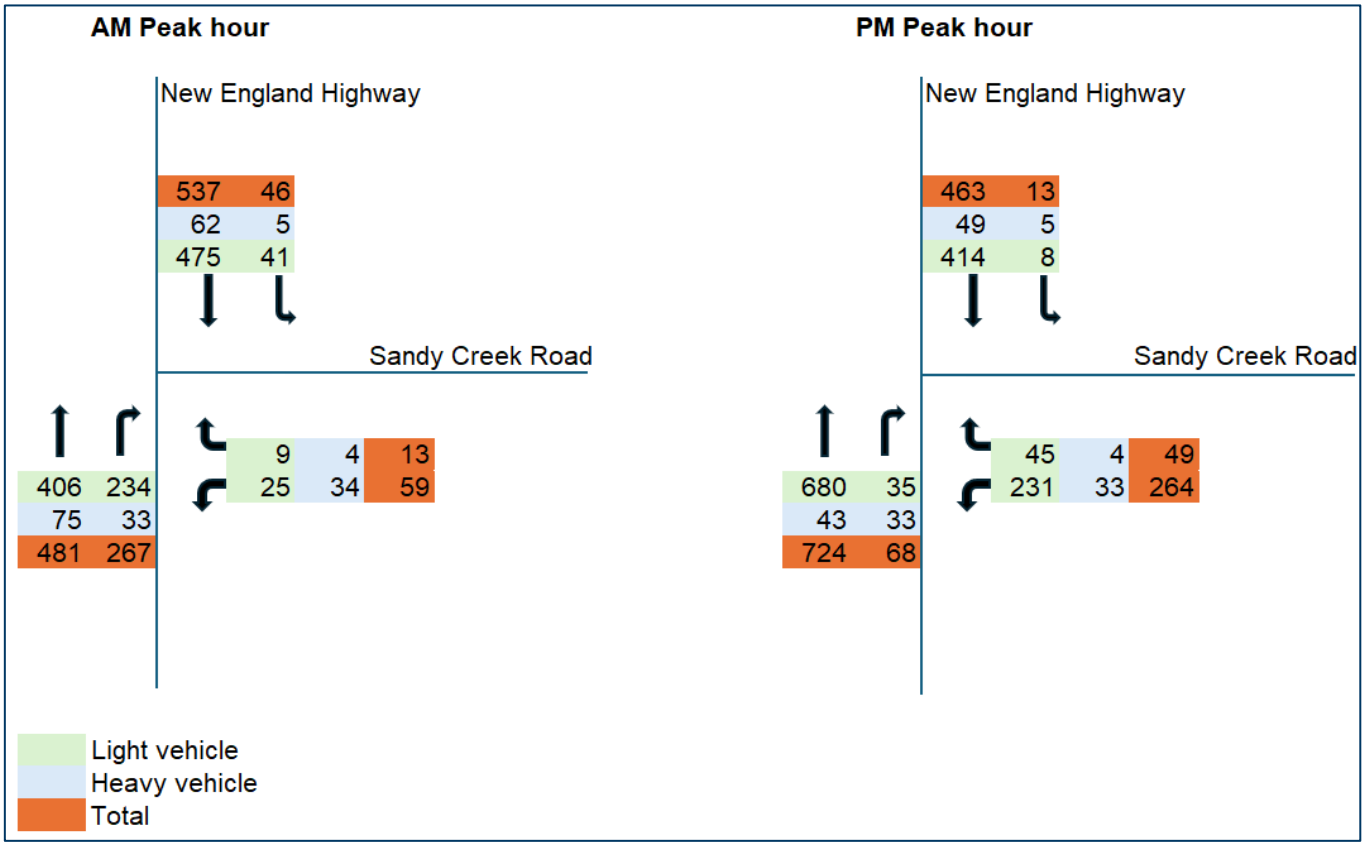


Figure 4.4 Build traffic volumes (2028)

5. Construction impacts

5.1 Traffic impacts

5.1.1 Intersection performance

The SIDRA modelling results at the intersection of the New England Highway (A15) and Sandy Creek Road for the "no build" and "build" scenarios are shown in Table 5.1.

Table 5.1 2028 intersection performance

Intersection leg	AM Peak			PM Peak		
	Av Delay (sec)	LoS	95th % Queue (m)	Av Delay (sec)	LoS	95th % Queue (m)
"No Build"						
New England Highway (A15) – south	4	A	14	1	A	4
Sandy Creek Road	22	B	5	17	B	12
New England Highway (A15) – north	0	A	0	0	A	0
All vehicles	**3**	**A**	**-**	**3**	**A**	**-**
"Build"						
New England Highway (A15) – south	5	A	22	1	A	6
Sandy Creek Road	26	B	7	20	B	18
New England Highway (A15) – north	1	A	0	0	A	0
All vehicles	**4**	**A**	**-**	**5**	**A**	**-**

The data in Table 5.1 indicates that in the 2028 horizon year, the intersection of New England Highway (A15) and Sandy Creek Road is expected to operate with an acceptable LoS for both the "build" and "no build" scenarios.

It is noted that in both scenarios:

– Vehicles on the New England Highway (A15) are expected to operate under free-flow conditions (LoS A).
– Vehicles turning from Sandy Creek Road onto New England Highway (A15) will be subject to higher delays, i.e. 17 seconds to 20 seconds in the "no build" scenario and 20 seconds to 26 seconds in the "build" scenario, which are associated with a LoS B.
– These higher delays are primarily associated with vehicles turning right from Sandy Creek Road onto New England Highway.

These results are consistent with the outputs of the Muswellbrook Solar Farm Traffic Assessment (EMM, 2023), which indicates that the intersection of New England Highway (A15) and Sandy Creek Road is expected to operate with a good LoS, accounting for the background traffic growth and the cumulative impacts of other proposed developments on Sandy Creek Road (the Muswellbrook Bypass and Muswellbrook BESS).

All SIDRA outputs are included in Appendix B.

5.1.2 Mid-block performance

The VCR of the key roads in the study area is determined in accordance with the criteria in Section 2.3.2, are presented in Table 5.2 for the "No build" scenario and Table 5.3 for the "Build" scenario.

Table 5.2 Peak hour mid-block VCR – 2028 "no build"

Intersection leg	Direction	Number of lanes	Capacity per lane[1]	Future traffic (2028) (pcu)		Volume capacity ratio (2028)	
				AM Peak	PM Peak	AM Peak	PM Peak
New England Highway (A15) – North	Northbound	1	1,200	571	808	0.48	0.67
	Southbound	1	1,200	639	528	0.53	0.44
New England Highway (A15) – South	Northbound	1	1,200	790	842	0.66	0.70
	Southbound	1	1,200	667	743	0.56	0.62
Sandy Creek Road	Eastbound	1	900	273	91	0.30	0.10
	Westbound	1	900	82	272	0.09	0.30

Table 5.3 Peak hour mid-block VCR – 2028 "build"

Intersection leg	Direction	Number of lanes	Capacity per lane[1]	Future traffic (2028) (pcu)		Volume capacity ratio (2028)	
				AM Peak	PM Peak	AM Peak	PM Peak
New England Highway (A15) – North	Northbound	1	1,200	573	820	0.48	0.68
	Southbound	1	1,200	651	530	0.54	0.44
New England Highway (A15) – South	Northbound	1	1,200	856	868	0.71	0.72
	Southbound	1	1,200	693	809	0.58	0.67
Sandy Creek Road	Eastbound	1	900	351	119	0.39	0.13
	Westbound	1	900	110	350	0.12	0.39

The data in Table 5.2 and Table 5.3 indicate that in the 2028 horizon year, the key roads in proximity to the project area are expected to operate well below their maximum capacity (VCR 1.0) in peak hour and throughout the rest of the day for both the "no build" and "build" scenarios.

Accordingly, other than the additional hardstand/pavement widening required to support the movement of OSOM vehicles (refer to Section 5.2), no additional upgrades to the road network are required to support the construction of the project.

5.2 OSOM movements

5.2.1 OSOM vehicle design

A small number of high risk OSOM vehicle movements (expected up to two) are likely to be required during construction. These movements would be associated with the delivery of the project transformers and other large or heavy plant and equipment.

Each transformer is anticipated to have approximate dimensions of up to 13.4 metres in length, 4.88 metres in width, 4.5 metres in height and a mass of about 180 tonnes. As this equipment represents the largest load required for the project, the corresponding OSOM vehicle has been adopted for the purposes of the route feasibility assessment. Based on industry information, the indicative OSOM vehicle dimensions required is shown in Figure 5.1.

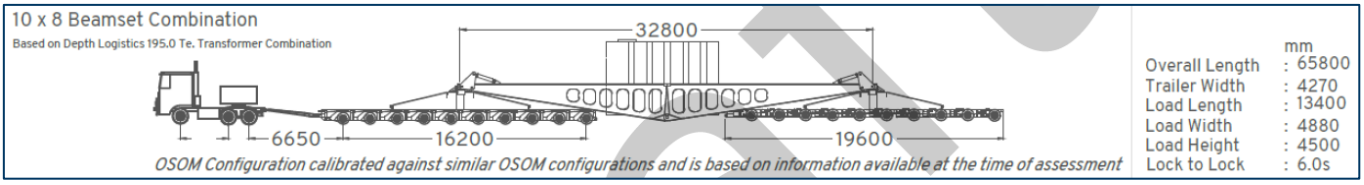


Figure 5.1 Assumed OSOM vehicle configuration and details

Confirmation of the proposed OSOM delivery route, vehicle details and detailed haulage planning, including escort requirements, traffic management and permit conditions, would be undertaken prior to transport by the transport operator.

5.2.2 Route overview

A concept-level OSOM route assessment between the Port of Newcastle and the project area has been prepared and is provided in Appendix C. The preferred route has been selected to maximise use of major State roads and align with the Port to Renewable Energy Zones (Port to REZ) transport corridor. The proposed route extends from the Port of Newcastle via the New England Highway (A15) and Golden Highway (B84) corridor before transitioning to the local road network near Muswellbrook.

The proposed route relies on the Muswellbrook detour identified by Transport for NSW and EnergyCo as part of the broader Port to REZ program. This detour uses Bengalla Road, Wybong Road, Kayuga Road, Invermein Street, Stair Street and Dartbrook Mine Private Access Road to reconnect with the New England Highway. From there, the route continues via Sandy Creek Road to the project area.

The proposed OSOM route is shown in Figure 5.2.

5.2.3 Identified constraints

The OSOM route assessment (refer to Appendix C) identifies that no permanent road or intersection upgrades are required by the project to facilitate the transformer delivery vehicle. With the exception of sections that form part of the Port to Renewable Energy Zone (REZ) enabling works program, the identified constraints, including insufficient road width, conflicts with barriers, kerbs and median islands, and inadequate signage clearance, require localised measures at specific locations on the local road network near the project area. These measures are expected to be temporary in nature and managed as part of detailed OSOM transport planning and construction planning. The temporary measures include temporary pavement widening (placement of gravel), temporary removal and reinstatement of signs, guideposts, barriers or fencing, and controlled kerb or median traversals under traffic management.

Strategic concept designs (refer to Appendix D) have been prepared for locations where temporary measures are required, namely the New England Highway / Sandy Creek Road intersection and the project area access point at 578 Sandy Creek Road.

The final extent and design of any temporary works would depend on the confirmed transport vehicle configuration and detailed assessments and permitting undertaken prior to haulage. These matters would be resolved during detailed OSOM route assessment and the NHVR permitting process, in consultation with Transport for NSW, Muswellbrook Shire Council, relevant rail infrastructure managers and other affected authorities.



Paper Size ISO A4

0 4 8 12 16

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

BW ESS
McCullys Gap Battery Energy Storage System
Traffic and Transport

Project No. **12627183**
Revision No. **0**
Date **20/05/2026**

Proposed OSOM vehicle route

FIGURE 5.2

\\ghdnet\ghd\AU\Sydney\Projects\21\12627183\GIS\Maps\Deliverables\12627183_TrafficAndTransport.aprx
Print date: 20 May 2026 - 09:32

Data source: Penso Power: Project concept layout, 2024; LPI: DTDB / DCDB, 2024; Nearmap imagery extracted 20241112 Roads selection: ; Roads selection 2: ; Roads selection 1: ; Proposed OSOM Route: ; Railway: ; Roads: ; World Imagery: Earthstar Geographics.
Created by: epangan

5.3 Other impacts

5.3.1 Impacts to public transport

As outlined in Section 3.2.1, there are no public bus stops along the New England Highway (A15) near Sandy Creek Road. Osborn's Transport operates bus services within Muswellbrook, and a single school bus service runs along Sandy Creek Road.

As detailed in Section 3.5.2, RAV vehicles are not permitted to travel on Sandy Creek Road between 7.30am to 8.30am and 3.45pm to 4.45pm on school days, in order to minimise potential interactions with school buses. No changes are proposed to school bus operations to accommodate the construction of the project, as most construction activities are not expected to coincide with school bus schedules.

Prior to construction, a Construction Traffic Management Plan will be prepared, which will include a driver's code of conduct for haulage operations, outlining appropriate behaviour and safety requirements for heavy vehicle drivers on public roads. The plan will be developed in consultation with relevant stakeholders, including public transport and bus operators.

5.3.2 Rail crossing assessment

As detailed in section 3, Sandy Creek Road crosses the Main Northern Line. The rail crossing is subject to the following conditions:

– Approximately 53 to 59 trains traverse the rail crossing on Sandy Creek Road per day, over a 24-hour period.
– In the AM peak (8 am to 9 am), there are three train movements that will temporarily stop vehicular traffic at the level crossing.
– In the PM peak (3.30 pm to 4.30 pm), there are two train movements that will temporarily stop vehicular traffic at the level crossing.

Additionally, the New England Highway (A15) does not include a dedicated left-turn lane north of Sandy Creek Road. However, to the south of Sandy Creek Road, it provides an AUR lane with a storage length of approximately 60 metres.

A distance of approximately 45 metres is provided between the New England Highway (A15) and the rail crossing, which provides limited queuing space for inbound vehicles (towards Sandy Creek Road), with a potential risk for construction vehicles to queue back onto the New England Highway (A15).

A SIDRA assessment has been undertaken to determine the impacts of rail services during peak periods of morning activity for both the 2028 "no build" traffic volumes (refer to Figure 4.3) and the "build" traffic volumes (refer to Figure 4.4). For the purposes of analysis, it has been assumed that in both the AM and PM peak hours:

– Three trains will traverse the rail crossing per hour.
– The level crossing will be closed to traffic for three minute 43 seconds per train.

The layout of the intersection, as modelled in SIDRA to account for the impact of the rail crossing, is presented in Figure 5.3.

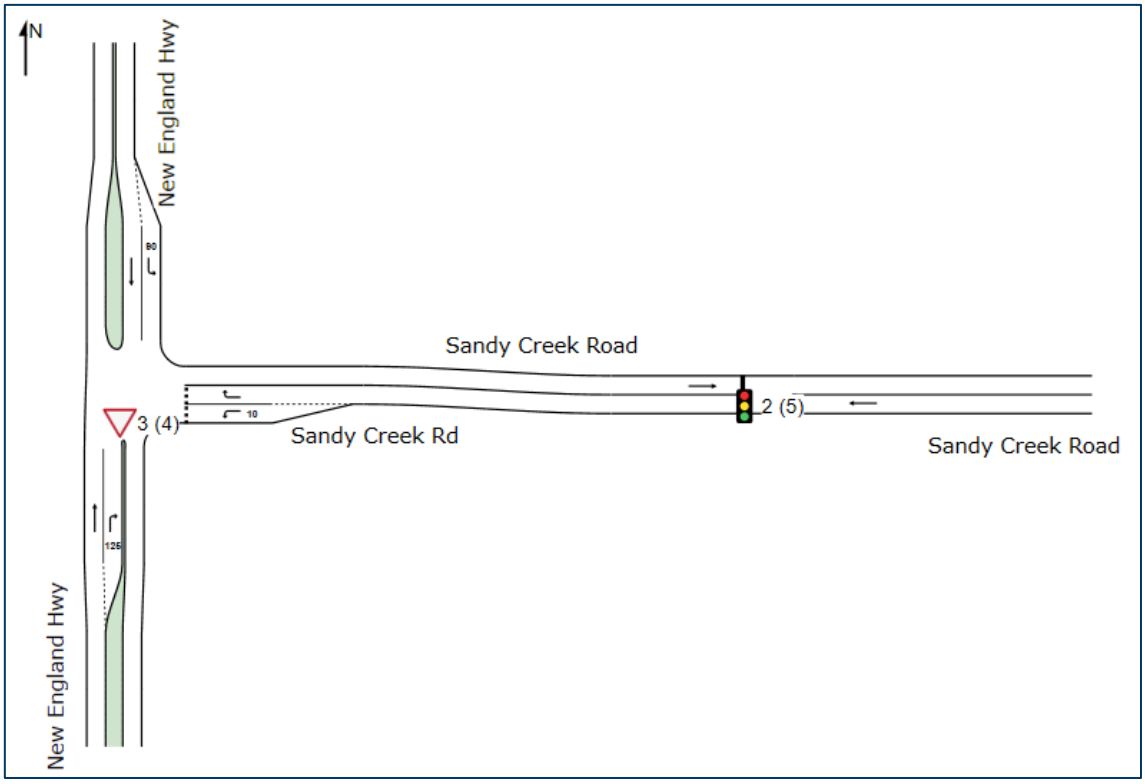


Figure 5.3 New England Highway/Sandy Creek Road and level crossing layout

The results of the SIDRA analysis accounting for the rail crossing closures are displayed in Table 5.4.

Table 5.4 2028 intersection performance – rail crossing assessment

Intersection leg	AM Peak			PM Peak		
	Av Delay (sec) [1]	LoS	95th % Queue (m)[2]	Av Delay (sec) [1]	LoS	95th % Queue (m)[2]
"No Build"						
New England Highway (A15) – south	12	A	186	3	A	4
Sandy Creek Road	22	B	5	16	B	11
New England Highway (A15) – north	2	A	57	1	A	0
All vehicles	**8**	**A**	**-**	**4**	**A**	**-**
"Build"						
New England Highway (A15) – south	14	A	266	3	A	57
Sandy Creek Road	26	B	7	20	B	16
New England Highway (A15) – north	3	A	70	1	A	36
All vehicles	**10**	**A**	**-**	**6**	**A**	**-**

Notes: 1. The delay and LoS are based on the average delays over an hourly period.
2. The 95th percentile queue is indicative of the longest queues within the hour, expected while the level crossing is closed to road traffic.

In summary:

– The data in Table 5.4 indicates that accounting for the impact of the rail crossing, the intersection of New England Highway and Sandy Creek Road is expected to operate with an overall acceptable LoS in the AM and PM peak hours in both the "no build" and "build" scenarios.

– The longest queues on the New England Highway are expected to occur in the AM peak hour when the majority of construction vehicles are expected to be inbound.

– During rail crossing closures in the AM peak hour:
  - For both the “no build” and “build” scenarios, the left turn queues on the northern leg of the New England Highway will be contained.
  - For the “no build” scenario, the 95th percentile queue on the southern leg of the New England Highway is expected to be 186 metres.
  - For the “build” scenario, the 95th percentile queue on the southern leg of the New England Highway is expected to be 266 metres.

In both scenarios, the queues are expected to extend back beyond the right-turn lane on the New England Highway and result in short periods of delays for northbound and southbound vehicles.

To mitigate potential queuing issues:

– The construction contractor engages with the ARTC to identify the rail timetables and confirm required communication protocols during construction.
– During construction activities, heavy vehicle movements are scheduled (where practicable), to minimise potential impacts of queueing.
– The potential use of traffic controllers to manage the movement of vehicles on the New England Highway (A15) during rail crossings be considered.
– Instructions for drivers not to queue across or near the level crossing.

Mitigation measures to address potential risks of construction vehicles traversing the rail crossing are detailed in section 8.

5.3.3 Rail services assessment

As detailed in section 3.2.3, commuter services, freight, grain, and coal trains also traverse the rail line in proximity to the project area.

The construction and operation of the project will not impact the operation of rail services as there will be no need for temporary closures or restrictions on rail movements.

5.3.4 Impacts to active transport

As detailed in section 3.3, there are no walking or cycling facilities in proximity to the project area.

Accordingly, the impact of the project on active transport facilities is expected to be negligible.

5.3.5 Impacts to loading and parking

All heavy vehicle parking, loading and unloading activities will occur within the project area. All heavy vehicles will enter the site in a forward direction, manoeuvre internally and exit the site in a forward direction.

Parking for the project area will be provided during construction.

5.3.6 Management of road safety during construction

In relation to potential impacts on road safety, the following matters have been identified:

– The crash review outlined in section 3.4 shows that six crashes occurred within 500 metres (approximately) of the intersection of New England Highway (A15) and Sandy Creek Road.
– Appropriate traffic control measures in the vicinity of the project area should be adopted to ensure that the safety of all road users is not impacted by construction-related vehicles travelling to and from the site.
– The intersection of New England Highway and Sandy Creek Road will operate as an upgraded CHR treatment during construction (refer to section 3.7.1), providing a dedicated right-turn lane that allows northbound vehicles to safely pass vehicles turning right into Sandy Creek Road.
– A temporary reduction in speed on Sandy Creek Road in the vicinity of the project area access, would support the SISD (refer to section 5.3.7).

5.3.7 Sight distance assessment

A sight distance assessment for the proposed project area access points off Sandy Creek Road has been undertaken in accordance with the criteria specified in *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2020b).

It is noted that this sight distance is an estimate based on Google imagery interpretation and is assumed to be representative of existing conditions.

The Austroads Guide specified Safe Intersection Sight Distance (SISD) is:

The minimum distance which should be provided at the major road at an intersection. SISD provides sufficient distance for a driver on a major road to observe a vehicle on a minor road to be able to decelerate and stop before moving into a collision situation.

The SISD criteria from the Austroads Guidelines are detailed in Table 5.5.

Table 5.5 SISD distances

Design speed (km/h)	SISD	
	1.5 second reaction time	2 seconds reaction time
60	114 metres	123 metres
70	141 metres	151 metres
80	170 metres	181 metres
90	201 metres	214 metres
100	234 metres	248 metres

Sandy Creek Road has a speed limit of 100 kilometres per hour and requires a SISD of 234 metres to 248 metres.

Photos of the sight distances at the project area access points at 578 Sandy Creek Road, are as follows

– Sandy Creek Road viewed to the east (refer to Figure 5.4).
– Sandy Creek Road viewed to the west (refer to Figure 5.5).



Figure 5.4 578 Sandy Creek Road – looking east



Figure 5.5 578 Sandy Creek Road – looking west

The SISD assessment was undertaken based on desktop inspection using imagery from Nearmap, Google Street view and site inspection photos at 578 Sandy Creek Road. Based on a review of Figure 5.4 and Figure 5.5, the desktop assessment indicates a sight distance of approximately 200 metres to the east and west (refer to Figure 5.6).



Source: Nearmap modified by GHD (image taken March 2025)

Figure 5.6 578 Sandy Creek Road – Desktop SISD assessment

The identified sight distances are not compliant with the SISD requirements for a 100 kilometres per hour road. However, assuming a temporary 80 kilometres per hour construction speed zone is implemented on Sandy Creek Road in the vicinity of the project area access, the SISD distances specified by Austroads would be readily achieved.

Images (sourced from Google Maps) at the project area access points at 380 Sandy Creek Road, are as follows:

– Sandy Creek Road viewed to the north (refer to Figure 5.7).
– Sandy Creek Road viewed to the south (refer to Figure 5.8).



Source: Google Maps (image taken January 2025)

Figure 5.7 380 Sandy Creek Road – looking north



Source: Google Maps (image taken January 2025)

Figure 5.8 380 Sandy Creek Road – looking south

The SISD assessment was undertaken based on desktop inspection using imagery from Nearmap and Google Street View at 380 Sandy Creek Road. Based on a review of Figure 5.7 and Figure 5.8, the desktop assessment indicates a sight distance of approximately 135 metres to the north and 250 metres to the south (refer to Figure 5.9).

Accordingly, based on a two-second reaction time, the SISD requirements to the south of 380 Sandy Creek Road are met. To the north, the available SISD does not comply with the requirements for a 100 kilometres per hour road, but is compliant with a 60 kilometres per hour speed limit. Therefore, a temporary 60 kilometres per hour construction speed zone on Sandy Creek Road in the vicinity of the project area access (380 Sandy Creek Road) would be required in order for the specified Austroads SISD distances to be achieved.



Source: Nearmap modified by GHD (image taken March 2025)

Figure 5.9 380 Sandy Creek Road – Desktop SISD assessment

6. Operation and decommissioning impacts

Given that only six field staff are required for operation and maintenance activities, the traffic impacts associated with operation (including maintenance) are expected to be negligible.

Decommissioning works would be significantly less intensive than construction activities, involving fewer personnel, less equipment and shorter durations of work. As such, vehicle volumes and traffic movements would be lower than during construction, and negligible impacts on the local and regional road network are expected.

Measures to manage potential traffic and access impacts during decommissioning will be defined in the Decommissioning Management Plan, which will include a traffic and access plan adapted from the Construction Traffic Management Plan. These measures will be consistent with relevant regulatory and best practice requirements in effect at the time.

7. Cumulative impacts

As outlined in section 2.4, cumulative impacts have been assessed in accordance with the *Guide to Transport Impact Assessment* (Transport for NSW, 2024). These guidelines require that traffic and transport assessments consider background traffic growth together with other planned developments that may influence network conditions during the same assessment year.

Section 19.1 of the EIS outlines the assessment methodology for cumulative impacts, including the methods for identifying what projects have been considered as part of the issue-specific cumulative impact assessments for the project. Cumulative impacts for traffic and transport impacts were assessed with reference to the *Cumulative Impact Assessment Guidelines for State Significant Projects* guidelines (DPE, 2022) (the Cumulative Impact Assessment Guidelines) as the key NSW Government framework for assessing project-level cumulative impacts for State significant development projects.

In accordance with the Cumulative Impact Assessment Guidelines, this cumulative impact assessment has considered relevant future projects that could result in a material impact on key matters, including the existing road network.

The study area for the cumulative impact assessment has been defined as the Sandy Creek Road corridor between the project area and its intersection with the New England Highway (A15). This area represents the road network most directly affected by project-related and other development construction traffic. Consistent with the *Guide to Transport Impact Assessment* (Transport for NSW, 2024) and the Cumulative Impact Assessment Guidelines, the study area has been selected based on the road links and intersections where cumulative traffic loads could reasonably result in material operational effects. Traffic from nearby approved and proposed developments would utilise the same highway intersection, making this the appropriate geographic scope for assessing cumulative impacts. More distant parts of the Muswellbrook Shire LGA were not included, as cumulative traffic influence diminishes rapidly with distance and does not meaningfully load the wider network.

A review of other planned developments was undertaken using publicly available material on the NSW Major Projects website.

A review of developments in the vicinity of Sandy Creek Road identified a number of approved and proposed projects with the potential to overlap with the construction period of the project. These include:

– Muswellbrook Solar Farm
– Muswellbrook BESS
– Muswellbrook Bypass
– Queensland Hunter Gas Pipeline
– Muswellbrook Pumped Hydro Energy Storage
– Bells Mountain BESS
– Gelston BESS
– Muswellbrook Thermal Storage Facility.

For each of these projects, peak hour traffic volumes were sourced from their respective EIS documents on the NSW Government's Major Project Portal and incorporated into the impact assessment in Section 5, where available. A summary of relevant future projects for the cumulative impact assessment is provided in Table 7.1.

Table 7.1 Relevant future projects

Project name	Approx distance to project area	Status	Planned construction start date	Cumulative traffic impacts
Muswellbrook Solar Farm (SSD-46543209)	800 metres south	Approved	2026	Cumulative traffic impacts during construction are assessed in section 5. No significant impacts to the local road network are anticipated. No cumulative traffic impacts during operation and decommissioning are expected due to very low vehicle movements associated with the project.
Muswellbrook Battery Energy Storage System (SSD-29704663 -Mod-1)	3.9 kilometres southwest	Approved. Submitted modification application in 2025.	Construction expected to start in Q4 2026 and take 12 months.	
Muswellbrook Bypass	4 kilometres southwest	Approved	2027	
Queensland Hunter Gas Pipeline (MP06_0286)	Immediately east	Approved	Unknown	
Muswellbrook Pumped Hydro Energy Storage (SSI-76014961)	Immediately south, connecting into the Muswellbrook 330 kV substation	Preparing EIS	2026	Traffic generation information is not yet available. No significant impacts to the local road network are anticipated.
Bells Mountain(Sandy Creek) Battery Energy Storage System (SSD-83968208)	Immediately southwest, connecting into the Muswellbrook 330 kV substation	Preparing EIS	2027 – 2028	
Gelston Battery Energy Storage System (SSD-104190458)	Immediately southwest, connecting into the Muswellbrook 330 kV substation	Preparing EIS	2027 – 2028	
Muswellbrook Thermal Storage Facility (SSD-88560713)	2.2 kilometres southwest	Preparing EIS	Unknown	

Note: Information sourced from NSW Government Major Projects website.

A number of the developments currently at 'Preparing EIS' stage, do not have sufficient available inputs (e.g., peak hour construction volumes, confirmed access routes, or sequenced programs) to support inclusion in this assessment. However, even for these projects, significant cumulative impacts are not expected because the road network, particularly Sandy Creek Road and the New England Highway (A15)/Sandy Creek Road intersection already demonstrates substantial remaining capacity. The quantitatively assessed projects represent the majority of known traffic demand, and the remaining projects for which detailed traffic data is not yet available are expected to generate comparatively low and intermittent construction traffic along Sandy Creek Road, typical of utility-scale energy developments. Given the available network capacity, the generally low baseline traffic volumes, and the conservative assessment assumption that all projects would potentially overlap, any additional traffic from these projects would not materially change intersection performance or mid-block operations.

The cumulative analysis of traffic impacts for the construction stage (refer to section 5) indicates that in the 2028 horizon year:

– The intersection of New England Highway (A15) and Sandy Creek Road is expected to operate with a good level of service.
– New England Highway (A15) and Sandy Creek Road are expected to operate with traffic volumes well within their mid-block capacities.

Accordingly, no significant cumulative impacts on traffic and transport are anticipated as a result of the project.

Preliminary discussions regarding road maintenance contributions have been held with Muswellbrook Shire Council. The specific contribution arrangements will be confirmed and finalised following project approval.

8. Mitigation and management measures

8.1 Approach to mitigation

The assessment identified that the main potential for impacts resulting from the project would be during the construction phase and would be associated with managing the safe movement of OSOM vehicle loads to and from the project area.

The key approach to managing these and other potential project impacts would be through the preparation of a construction traffic management plan as part of the construction environmental management plan (CEMP). The plan would define the processes, responsibilities and management measures to minimise potential impacts on traffic and access and include a driver's code of conduct. Management and mitigation measures for OSOM movements would also be required to facilitate the safe transport of OSOM loads to and from the project area.

Consultation with landholders, infrastructure owners and operators will also be essential to understand design and construction requirements that need to be considered and integrated in the subsequent design and construction stages of the project.

8.2 Mitigation measures

Table 8.1 provides measures to avoid, minimise and mitigate the identified impacts on traffic and access during construction and decommissioning.

Table 8.1 Mitigation measures – traffic and transport

Impact/issue	Mitigation measure	Timing
Managing the potential for traffic, transport, access and parking impacts during construction	Design and construction planning will aim to avoid or minimise traffic, transport and access impacts on the surrounding road network as far as practicable.	Detailed design / Pre-construction
	A Construction Traffic Management Plan (CTMP) will be prepared and implemented as part of the CEMP to manage traffic, transport and access impacts during construction. The CTMP will be prepared in consultation with Muswellbrook Shire Council, Transport for NSW and Australian Rail Track Corporation, as relevant, and will include measures to: – maintain the safe and efficient operation of affected public roads – manage construction vehicle access and movements – implement appropriate traffic control arrangements where required – define a driver code of conduct for construction and haulage vehicles.	Pre-construction / Construction
OSOM route planning and permitting	Oversize overmass (OSOM) vehicle movements will be managed in accordance with applicable approvals and permits. Vehicle dimensions and routes will be confirmed prior to OSOM movements and in accordance with necessary permits. OSOM movements will be undertaken in accordance with the approved CTMP and in consultation with relevant road authorities.	Pre-construction / Construction
Temporary road modifications to facilitate OSOM vehicle movements	Temporary road modifications required to facilitate OSOM vehicle movements (such as gravel placement or temporary signage relocation) will be designed and implemented in consultation with the relevant road owner and reinstated following completion of construction activities, unless otherwise agreed.	Detailed design / Construction
Impacts on local roads	Road condition surveys of Sandy Creek Road will be undertaken prior to and following construction, to the satisfaction of the relevant road authority. Where construction activities result in damage to this road, the road will be reinstated to pre-survey condition, or as otherwise agreed with the road authority.	Construction

Impact/issue	Mitigation measure	Timing
Sight distances	Prior to construction, temporary speed management measures will be implemented on Sandy Creek Road in the vicinity of the project access points to ensure compliance with Austroads SISD requirements. The temporary speed environment, associated signage, and any required traffic control measures will be determined in consultation with the relevant road authority and documented within the CTMP.	Construction
Cumulative impacts	Coordination with other relevant projects and proponents will be undertaken during detailed design and construction to manage potential cumulative traffic effects, including consideration of construction timing, shared access routes and traffic management requirements, where reasonably practicable.	Detailed design / Construction
Decommissioning impacts	The Decommissioning Management Plan will include measures to manage traffic and access during the decommissioning of the project. The plan will include appropriate traffic control measures in consultation with the relevant road authority, including Muswellbrook Shire Council.	Decommissioning

9. Conclusion

This traffic and transport assessment considers the potential impact on traffic and transport infrastructure in accordance with the SEARs.

Based on a review of traffic and transport infrastructure and facilities in the study area, including road hierarchy, road network operation, freight access, public transport, active transport, crash data, existing traffic volumes and intersection performance, the assessment concludes the following:

– Intersection analysis indicates that in the 2028 horizon year, the intersection of New England Highway (A15) and Sandy Creek Road is expected to operate with an acceptable LoS for both the “build” and “no build” scenarios.
– A mid-block assessment indicates that New England Highway (A15) and Sandy Creek Road would continue to operate below their assessed capacities.
– The SISD assessment for the two project area access points on Sandy Creek Road indicates that temporary speed management would be required during construction in order to achieve the relevant Austroads SISD criteria.
– The concept-level OSOM route assessment indicates that localised temporary works and traffic management would be required at specific locations to accommodate the transformer delivery vehicle.
– Heavy vehicles, including OSOM movements, would be needed and would be managed via the implementation of a construction traffic management plan, including a driver’s code of conduct and consultation with relevant stakeholders, including any relevant permits for the OSOM vehicle routes and vehicles to be used.
– Potential impacts on the local and regional road network during operation (including maintenance) are expected to be negligible.
– Decommissioning activities are expected to be of limited scale, and traffic volumes are expected to be low. As such, the impact on the local and regional road network is expected to be negligible.

Mitigation and management measures have been proposed to avoid and minimise potential impacts on traffic and transport infrastructure and facilities. With the implementation of the identified mitigation and management measures, minimal impacts are expected during construction, and negligible impacts are expected during operation and decommissioning.

10. Limitations

This report has been prepared by GHD Pty Ltd for Muswellbrook Pro Unit Holdings Pty Ltd and may only be used and relied on by Muswellbrook Pro Unit Holdings Pty Ltd for the purpose set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Muswellbrook Pro Unit Holdings Pty Ltd 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 assumptions set out in the report.

The opinions, conclusions and any recommendations in this report are based on the assessment undertaken 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 finalised.

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.

11. References

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Appendices

Appendix A

Traffic Survey Outputs

Existing

MOVEMENT SUMMARY

Site: [3 (5)] 2025_current_AM_Upgrade NewEnglandHwy/SandyCreekRd (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.9.250

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	476	15.3	476	15.3	0.281	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	33	3.2	33	3.2	0.044	8.6	LOS A	0.2	1.2	0.52	0.71	0.52	45.2
Approach			508	14.5	508	14.5	0.281	0.6	NA	0.2	1.2	0.03	0.05	0.03	59.1
East: Sandy Creek Rd															
4	L2	All MCs	29	10.7	29	10.7	0.045	7.1	LOS A	0.1	1.2	0.51	0.71	0.51	45.9
6	R2	All MCs	9	0.0	9	0.0	0.046	20.0	LOS B	0.1	1.0	0.82	0.92	0.82	35.9
Approach			39	8.1	39	8.1	0.046	10.2	LOS A	0.1	1.2	0.58	0.76	0.58	43.0
North: New England Hwy															
7	L2	All MCs	7	14.3	7	14.3	0.005	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	513	11.7	513	11.7	0.294	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			520	11.7	520	11.7	0.294	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles			1067	12.9	1067	12.9	0.294	0.8	NA	0.2	1.2	0.04	0.05	0.04	58.9

MOVEMENT SUMMARY

Site: [3 (6)] 2028_current_PM_Upgrade NewEnglandHwy/SandyCreekRd (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.9.250

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	698	5.9	698	5.9	0.379	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	39	5.4	39	5.4	0.049	8.2	LOS A	0.2	1.4	0.50	0.69	0.50	45.5
Approach			737	5.9	737	5.9	0.379	0.6	NA	0.2	1.4	0.03	0.04	0.03	59.2
East: Sandy Creek Rd															
4	L2	All MCs	29	3.6	29	3.6	0.039	6.2	LOS A	0.1	1.0	0.47	0.66	0.47	47.3
6	R2	All MCs	11	0.0	11	0.0	0.074	28.2	LOS B	0.2	1.6	0.88	0.94	0.88	31.3
Approach			40	2.6	40	2.6	0.074	12.0	LOS A	0.2	1.6	0.58	0.74	0.58	41.7
North: New England Hwy															
7	L2	All MCs	9	11.1	9	11.1	0.006	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	458	10.1	458	10.1	0.259	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			467	10.1	467	10.1	0.259	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles			1244	7.4	1244	7.4	0.379	0.8	NA	0.2	1.6	0.03	0.05	0.03	58.9

2028 No Build

MOVEMENT SUMMARY

Site: [1 (3)] 2028_no build_AM_NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.416	2.2	LOS A	3.2	26.4	0.28	0.35	0.39	56.6
3	R2	All MCs	225	9.3	225	9.3	0.416	10.9	LOS A	3.2	26.4	0.59	0.74	0.83	45.8
Approach			732	13.7	732	13.7	0.416	4.9	NA	3.2	26.4	0.38	0.47	0.53	54.1
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.233	9.2	LOS A	0.7	8.3	0.75	0.92	0.84	35.7
6	R2	All MCs	13	25.0	13	25.0	0.233	50.1	LOS D	0.7	8.3	0.75	0.92	0.84	36.1
Approach			61	41.4	61	41.4	0.233	17.7	LOS B	0.7	8.3	0.75	0.92	0.84	35.8
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.346	5.8	LOS A	0.0	0.0	0.00	0.04	0.00	30.1
8	T1	All MCs	565	11.5	565	11.5	0.346	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.4
Approach			602	11.5	602	11.5	0.346	0.5	NA	0.0	0.0	0.00	0.04	0.00	57.5
All Vehicles			1395	14.0	1395	14.0	0.416	3.5	NA	3.2	26.4	0.23	0.30	0.31	54.9

MOVEMENT SUMMARY

Site: [1 (4)] 2028_no build_PM_NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.362	0.7	LOS A	1.0	7.8	0.13	0.15	0.13	58.9
3	R2	All MCs	58	36.4	58	36.4	0.362	10.2	LOS A	1.0	7.8	0.19	0.22	0.19	52.3
Approach			819	8.1	819	8.1	0.362	1.4	NA	1.0	7.8	0.13	0.15	0.13	58.6
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.552	9.7	LOS A	3.2	25.3	0.78	1.05	1.33	39.0
6	R2	All MCs	40	7.9	40	7.9	0.552	43.9	LOS D	3.2	25.3	0.78	1.05	1.33	38.8
Approach			262	9.2	262	9.2	0.552	14.9	LOS B	3.2	25.3	0.78	1.05	1.33	39.0
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.286	6.0	LOS A	0.0	0.0	0.00	0.01	0.00	30.1
8	T1	All MCs	487	10.6	487	10.6	0.286	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			500	11.2	500	11.2	0.286	0.2	NA	0.0	0.0	0.00	0.01	0.00	58.9
All Vehicles			1581	9.3	1581	9.3	0.552	3.3	NA	3.2	25.3	0.20	0.26	0.29	55.9

2028 Build

MOVEMENT SUMMARY

Site: [1 (5)] 2028_build_AM_NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.481	2.5	LOS A	4.1	34.5	0.26	0.34	0.41	56.4
3	R2	All MCs	281	12.4	281	12.4	0.481	12.1	LOS A	4.1	34.5	0.66	0.86	1.04	43.8
Approach			787	14.4	787	14.4	0.481	5.9	NA	4.1	34.5	0.40	0.53	0.64	52.9
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.327	11.0	LOS A	1.1	13.5	0.78	0.97	0.99	33.3
6	R2	All MCs	14	30.8	14	30.8	0.327	66.6	LOS E	1.1	13.5	0.78	0.97	0.99	33.9
Approach			76	52.8	76	52.8	0.327	21.0	LOS B	1.1	13.5	0.78	0.97	0.99	33.4
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.352	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	30.1
8	T1	All MCs	565	11.5	565	11.5	0.352	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	59.3
Approach			614	11.5	614	11.5	0.352	0.6	NA	0.0	0.0	0.00	0.05	0.00	56.8
All Vehicles			1477	15.2	1477	15.2	0.481	4.5	NA	4.1	34.5	0.25	0.35	0.39	53.6

MOVEMENT SUMMARY

Site: [1 (6)] 2028_build_PM_NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.386	1.1	LOS A	1.5	12.7	0.16	0.18	0.18	58.5
3	R2	All MCs	72	48.5	72	48.5	0.386	11.2	LOS A	1.5	12.7	0.25	0.28	0.28	51.0
Approach			833	9.6	833	9.6	0.386	2.0	NA	1.5	12.7	0.17	0.19	0.19	58.1
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.732	13.7	LOS A	5.6	46.7	0.87	1.31	1.99	35.4
6	R2	All MCs	52	8.2	52	8.2	0.732	53.9	LOS D	5.6	46.7	0.87	1.31	1.99	35.3
Approach			329	11.8	329	11.8	0.732	20.0	LOS B	5.6	46.7	0.87	1.31	1.99	35.4
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.287	6.1	LOS A	0.0	0.0	0.00	0.02	0.00	30.1
8	T1	All MCs	487	10.6	487	10.6	0.287	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach			501	11.3	501	11.3	0.287	0.3	NA	0.0	0.0	0.00	0.02	0.00	58.8
All Vehicles			1663	10.6	1663	10.6	0.732	5.0	NA	5.6	46.7	0.26	0.36	0.49	54.0

2028 No Build – Intersection Upgrade

MOVEMENT SUMMARY

Site: [3] 2028_no build_AM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	225	9.3	225	9.3	0.364	11.6	LOS A	1.8	14.1	0.65	0.92	0.84	42.2
Approach			732	13.7	732	13.7	0.364	3.7	NA	1.8	14.1	0.20	0.28	0.26	55.3
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.112	10.1	LOS A	0.4	4.3	0.61	0.81	0.61	41.3
6	R2	All MCs	13	25.0	13	25.0	0.216	67.5	LOS E	0.5	4.8	0.94	0.99	1.00	19.2
Approach			61	41.4	61	41.4	0.216	22.0	LOS B	0.5	4.8	0.67	0.85	0.69	33.3
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.022	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			602	11.5	602	11.5	0.323	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.3
All Vehicles			1395	14.0	1395	14.0	0.364	3.1	NA	1.8	14.1	0.13	0.20	0.17	56.1

MOVEMENT SUMMARY

Site: [3 (2)] 2028_no build_PM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	58	36.4	58	36.4	0.100	10.4	LOS A	0.4	3.9	0.56	0.78	0.56	43.2
Approach			819	8.1	819	8.1	0.413	0.9	NA	0.4	3.9	0.04	0.05	0.04	58.8
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.322	7.9	LOS A	1.4	11.3	0.57	0.81	0.68	45.1
6	R2	All MCs	40	7.9	40	7.9	0.505	64.7	LOS E	1.5	11.6	0.95	1.05	1.24	19.9
Approach			262	9.2	262	9.2	0.505	16.6	LOS B	1.5	11.6	0.63	0.85	0.76	37.8
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.009	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	48.1
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			500	11.2	500	11.2	0.276	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.6
All Vehicles			1581	9.3	1581	9.3	0.505	3.3	NA	1.5	11.6	0.12	0.17	0.15	55.9

MOVEMENT SUMMARY

Site: [3 (4)] 2028_build_AM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	281	12.4	281	12.4	0.477	13.3	LOS A	2.7	22.2	0.70	1.00	1.05	40.8
Approach			787	14.4	787	14.4	0.477	4.8	NA	2.7	22.2	0.25	0.36	0.38	53.9
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.157	11.0	LOS A	0.5	6.8	0.64	0.83	0.64	40.0
6	R2	All MCs	14	30.8	14	30.8	0.310	92.3	LOS F	0.7	7.0	0.95	1.01	1.07	15.5
Approach			76	52.8	76	52.8	0.310	25.7	LOS B	0.7	7.0	0.69	0.86	0.71	31.1
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.029	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			614	11.5	614	11.5	0.323	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles			1477	15.2	1477	15.2	0.477	4.1	NA	2.7	22.2	0.17	0.25	0.24	54.8

MOVEMENT SUMMARY

Site: [3 (3)] 2028_build_PM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	72	48.5	72	48.5	0.136	11.3	LOS A	0.5	6.1	0.58	0.81	0.58	42.4
Approach			833	9.6	833	9.6	0.413	1.1	NA	0.5	6.1	0.05	0.07	0.05	58.5
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.414	8.9	LOS A	2.1	17.6	0.61	0.88	0.82	44.0
6	R2	All MCs	52	8.2	52	8.2	0.687	82.4	LOS F	2.2	17.4	0.97	1.12	1.50	17.0
Approach			329	11.8	329	11.8	0.687	20.4	LOS B	2.2	17.6	0.66	0.91	0.93	35.2
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.010	6.0	LOS A	0.0	0.0	0.00	0.57	0.00	48.0
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			501	11.3	501	11.3	0.276	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles			1663	10.6	1663	10.6	0.687	4.7	NA	2.2	17.6	0.16	0.22	0.21	54.4

2028 No Build – Rail Crossing and Intersection Upgrade

MOVEMENT SUMMARY

Site: [3] 2028_no build_AM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Network: [3 (2)] 2028_no build_AM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	225	9.3	225	9.3	0.364	11.6	LOS A	-[N7]	-[N7]	0.65	0.92	0.84	43.7
Approach			732	13.7	732	13.7	0.364	3.7	NA	-[N7]	-[N7]	0.20	0.28	0.26	56.0
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.112	10.1	LOS A	0.3	4.1	0.61	0.81	0.61	41.3
6	R2	All MCs	13	25.0	13	25.0	0.216	67.3	LOS E	0.5	4.6	0.94	0.99	1.00	19.2
Approach			61	41.4	61	41.4	0.216	21.9	LOS B	0.5	4.6	0.67	0.85	0.69	33.4
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.022	5.7	LOS A	-[N7]	-[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			602	11.5	602	11.5	0.323	0.5	NA	-[N7]	-[N7]	0.00	0.04	0.00	59.5
All Vehicles			1395	14.0	1395	14.0	0.364	3.1	NA	-[N7]	-[N7]	0.13	0.20	0.17	56.5

MOVEMENT SUMMARY

Site: [2 (4)] 2028_no build_AM_SandyCreekRoadRLC (No Build)
Network: [3 (2)] 2028_no build_AM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
Approach			61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
West: Sandy Creek Road															
11	T1	All MCs	262	9.6	262	9.6	*0.177	25.9	LOS B	32.2[NB]	244.1[NB]	0.24	0.22	0.24	33.8
Approach			262	9.6	262	9.6	0.177	25.9	LOS B	32.2[NB]	244.1[NB]	0.24	0.22	0.24	33.8
All Vehicles			323	15.6	323	15.6	0.177	25.3	LOS B	32.2[NB]	244.1[NB]	0.24	0.21	0.24	33.8

MOVEMENT SUMMARY

Site: [3 (2)] 2028_no build_PM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Network: [4 (2)] 2028_no build_PM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	58	36.4	58	36.4	0.189	10.8	LOS A	0.4	4.2	0.59	0.81	0.61	44.9
Approach			819	8.1	819	8.1	0.413	0.9	NA	0.4	4.2	0.04	0.06	0.04	59.0
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.322	7.9	LOS A	1.3	10.6	0.54	0.83	0.64	45.1
6	R2	All MCs	40	7.9	40	7.9	0.505	63.7	LOS E	1.4	10.9	0.95	1.04	1.22	20.1
Approach			262	9.2	262	9.2	0.505	16.4	LOS B	1.4	10.9	0.61	0.86	0.73	37.9
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.017	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			500	11.2	500	11.2	0.276	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles			1581	9.3	1581	9.3	0.505	3.3	NA	1.4	10.9	0.12	0.18	0.14	56.1

MOVEMENT SUMMARY

Site: [2 (3)] 2028_no build_PM_SandyCreekRoadRLC (No Build)
Network: [4 (2)] 2028_no build_PM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	262	9.2	262	9.2	* 0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
Approach			262	9.2	262	9.2	0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
West: Sandy Creek Road															
11	T1	All MCs	71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
Approach			71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
All Vehicles			333	14.9	333	14.9	0.176	25.3	LOS B	32.2	243.2	0.24	0.21	0.24	33.1

2028 Build – Rail Crossing and Intersection Upgrade

MOVEMENT SUMMARY

Site: [3 (4)] 2028_build_AM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Network: [5 (2)] 2028_build_AM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	281	12.4	281	12.4	0.477	13.3	LOS A	[N7]	[N7]	0.70	1.00	1.05	42.1
Approach			787	14.4	787	14.4	0.477	4.8	NA	[N7]	[N7]	0.25	0.36	0.38	54.7
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.157	11.0	LOS A	0.5	6.4	0.64	0.83	0.64	40.0
6	R2	All MCs	14	30.8	14	30.8	0.310	91.7	LOS F	0.6	6.6	0.95	1.01	1.06	15.6
Approach			76	52.8	76	52.8	0.310	25.6	LOS B	0.6	6.6	0.69	0.86	0.71	31.2
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.029	5.7	LOS A	[N7]	[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			614	11.5	614	11.5	0.323	0.5	NA	[N7]	[N7]	0.00	0.05	0.00	59.4
All Vehicles			1477	15.2	1477	15.2	0.477	4.1	NA	[N7]	[N7]	0.17	0.25	0.24	55.3

MOVEMENT SUMMARY

Site: [2 (5)] 2028_build_AM_SandyCreekRoadRLC (Build)
Network: [5 (2)] 2028_build_AM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
Approach			76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
West: Sandy Creek Road															
11	T1	All MCs	329	12.1	329	12.1	* 0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
Approach			329	12.1	329	12.1	0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
All Vehicles			405	19.7	405	19.7	0.225	26.4	LOS B	42.5[NB]	328.2[NB]	0.25	0.22	0.25	33.2

MOVEMENT SUMMARY

Site: [3 (3)] 2028_build_PM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Network: [6 (2)] 2028_build_PM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	72	48.5	72	48.5	0.136	11.3	LOS A	-[N7]	-[N7]	0.58	0.81	0.58	44.5
Approach			833	9.6	833	9.6	0.413	1.1	NA	-[N7]	-[N7]	0.05	0.07	0.05	58.8
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.414	8.8	LOS A	2.0	16.4	0.59	0.88	0.78	44.1
6	R2	All MCs	52	8.2	52	8.2	0.687	80.4	LOS F	2.1	16.2	0.97	1.11	1.46	17.2
Approach			329	11.8	329	11.8	0.687	20.0	LOS B	2.1	16.4	0.65	0.92	0.89	35.5
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.010	6.0	LOS A	-[N7]	-[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			501	11.3	501	11.3	0.276	0.2	NA	-[N7]	-[N7]	0.00	0.02	0.00	59.7
All Vehicles			1663	10.6	1663	10.6	0.687	4.6	NA	-[N7]	-[N7]	0.15	0.22	0.20	54.6

MOVEMENT SUMMARY

Site: [2 (6)] 2028_build_PM_SandyCreekRoadRLC (Build)
Network: [6 (2)] 2028_build_PM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	329	11.8	329	11.8	* 0.225	27.1	LOS B	42.4	327.2	0.25	0.23	0.25	31.8
Approach			329	11.8	329	11.8	0.225	27.1	LOS B	42.4	327.2	0.25	0.23	0.25	31.8
West: Sandy Creek Road															
11	T1	All MCs	85	46.9	85	46.9	0.071	23.5	LOS B	9.5[NB]	93.5[NB]	0.22	0.19	0.22	35.2
Approach			85	46.9	85	46.9	0.071	23.5	LOS B	9.5[NB]	93.5[NB]	0.22	0.19	0.22	35.2
All Vehicles			415	19.0	415	19.0	0.225	26.4	LOS B	42.4[NB]	327.2[NB]	0.25	0.22	0.25	32.5

Appendix B

SIDRA Outputs

Existing

MOVEMENT SUMMARY

Site: [1] 2025_current_AM_NewEnglandHwy/SandyCreekRd (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	476	15.3	476	15.3	0.227	0.4	LOS A	0.4	3.1	0.09	0.11	0.09	59.2
3	R2	All MCs	33	3.2	33	3.2	0.227	8.3	LOS A	0.4	3.1	0.13	0.16	0.13	53.8
Approach			508	14.5	508	14.5	0.227	0.9	NA	0.4	3.1	0.09	0.12	0.09	59.0
East: Sandy Creek Rd															
4	L2	All MCs	29	10.7	29	10.7	0.070	6.3	LOS A	0.2	1.9	0.60	0.76	0.60	44.2
6	R2	All MCs	9	0.0	9	0.0	0.070	16.5	LOS B	0.2	1.9	0.60	0.76	0.60	44.4
Approach			39	8.1	39	8.1	0.070	8.8	LOS A	0.2	1.9	0.60	0.76	0.60	44.3
North: New England Hwy															
7	L2	All MCs	7	14.3	7	14.3	0.298	5.8	LOS A	0.0	0.0	0.00	0.01	0.00	30.3
8	T1	All MCs	513	11.7	513	11.7	0.298	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			520	11.7	520	11.7	0.298	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.3
All Vehicles			1067	12.9	1067	12.9	0.298	0.8	NA	0.4	3.1	0.07	0.09	0.07	58.7

MOVEMENT SUMMARY

Site: [1 (2)] 2025_current_PM_NewEnglandHwy/SandyCreekRd (Existing)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	698	5.9	698	5.9	0.303	0.3	LOS A	0.4	3.4	0.08	0.09	0.08	59.4
3	R2	All MCs	39	5.4	39	5.4	0.303	8.1	LOS A	0.4	3.4	0.11	0.13	0.11	54.2
Approach			737	5.9	737	5.9	0.303	0.7	NA	0.4	3.4	0.08	0.10	0.08	59.2
East: Sandy Creek Rd															
4	L2	All MCs	29	3.6	29	3.6	0.080	5.6	LOS A	0.3	2.0	0.63	0.76	0.63	43.8
6	R2	All MCs	11	0.0	11	0.0	0.080	20.6	LOS B	0.3	2.0	0.63	0.76	0.63	43.6
Approach			40	2.6	40	2.6	0.080	9.6	LOS A	0.3	2.0	0.63	0.76	0.63	43.8
North: New England Hwy															
7	L2	All MCs	9	11.1	9	11.1	0.264	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	30.3
8	T1	All MCs	458	10.1	458	10.1	0.264	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			467	10.1	467	10.1	0.264	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.1
All Vehicles			1244	7.4	1244	7.4	0.303	0.8	NA	0.4	3.4	0.07	0.09	0.07	58.8

2028 No Build

MOVEMENT SUMMARY

Site: [1 (3)] 2028_no build_AM_NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.416	2.2	LOS A	3.2	26.4	0.28	0.35	0.39	56.6
3	R2	All MCs	225	9.3	225	9.3	0.416	10.9	LOS A	3.2	26.4	0.59	0.74	0.83	45.8
Approach			732	13.7	732	13.7	0.416	4.9	NA	3.2	26.4	0.38	0.47	0.53	54.1
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.233	9.2	LOS A	0.7	8.3	0.75	0.92	0.84	35.7
6	R2	All MCs	13	25.0	13	25.0	0.233	50.1	LOS D	0.7	8.3	0.75	0.92	0.84	36.1
Approach			61	41.4	61	41.4	0.233	17.7	LOS B	0.7	8.3	0.75	0.92	0.84	35.8
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.346	5.8	LOS A	0.0	0.0	0.00	0.04	0.00	30.1
8	T1	All MCs	565	11.5	565	11.5	0.346	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.4
Approach			602	11.5	602	11.5	0.346	0.5	NA	0.0	0.0	0.00	0.04	0.00	57.5
All Vehicles			1395	14.0	1395	14.0	0.416	3.5	NA	3.2	26.4	0.23	0.30	0.31	54.9

MOVEMENT SUMMARY

Site: [1 (4)] 2028_no build_PM_NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.362	0.7	LOS A	1.0	7.8	0.13	0.15	0.13	58.9
3	R2	All MCs	58	36.4	58	36.4	0.362	10.2	LOS A	1.0	7.8	0.19	0.22	0.19	52.3
Approach			819	8.1	819	8.1	0.362	1.4	NA	1.0	7.8	0.13	0.15	0.13	58.6
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.552	9.7	LOS A	3.2	25.3	0.78	1.05	1.33	39.0
6	R2	All MCs	40	7.9	40	7.9	0.552	43.9	LOS D	3.2	25.3	0.78	1.05	1.33	38.8
Approach			262	9.2	262	9.2	0.552	14.9	LOS B	3.2	25.3	0.78	1.05	1.33	39.0
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.286	6.0	LOS A	0.0	0.0	0.00	0.01	0.00	30.1
8	T1	All MCs	487	10.6	487	10.6	0.286	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			500	11.2	500	11.2	0.286	0.2	NA	0.0	0.0	0.00	0.01	0.00	58.9
All Vehicles			1581	9.3	1581	9.3	0.552	3.3	NA	3.2	25.3	0.20	0.26	0.29	55.9

2028 Build

MOVEMENT SUMMARY

Site: [1 (5)] 2028_build_AM_NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.481	2.5	LOS A	4.1	34.5	0.26	0.34	0.41	56.4
3	R2	All MCs	281	12.4	281	12.4	0.481	12.1	LOS A	4.1	34.5	0.66	0.86	1.04	43.8
Approach			787	14.4	787	14.4	0.481	5.9	NA	4.1	34.5	0.40	0.53	0.64	52.9
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.327	11.0	LOS A	1.1	13.5	0.78	0.97	0.99	33.3
6	R2	All MCs	14	30.8	14	30.8	0.327	66.6	LOS E	1.1	13.5	0.78	0.97	0.99	33.9
Approach			76	52.8	76	52.8	0.327	21.0	LOS B	1.1	13.5	0.78	0.97	0.99	33.4
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.352	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	30.1
8	T1	All MCs	565	11.5	565	11.5	0.352	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	59.3
Approach			614	11.5	614	11.5	0.352	0.6	NA	0.0	0.0	0.00	0.05	0.00	56.8
All Vehicles			1477	15.2	1477	15.2	0.481	4.5	NA	4.1	34.5	0.25	0.35	0.39	53.6

MOVEMENT SUMMARY

Site: [1 (6)] 2028_build_PM_NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.386	1.1	LOS A	1.5	12.7	0.16	0.18	0.18	58.5
3	R2	All MCs	72	48.5	72	48.5	0.386	11.2	LOS A	1.5	12.7	0.25	0.28	0.28	51.0
Approach			833	9.6	833	9.6	0.386	2.0	NA	1.5	12.7	0.17	0.19	0.19	58.1
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.732	13.7	LOS A	5.6	46.7	0.87	1.31	1.99	35.4
6	R2	All MCs	52	8.2	52	8.2	0.732	53.9	LOS D	5.6	46.7	0.87	1.31	1.99	35.3
Approach			329	11.8	329	11.8	0.732	20.0	LOS B	5.6	46.7	0.87	1.31	1.99	35.4
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.287	6.1	LOS A	0.0	0.0	0.00	0.02	0.00	30.1
8	T1	All MCs	487	10.6	487	10.6	0.287	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach			501	11.3	501	11.3	0.287	0.3	NA	0.0	0.0	0.00	0.02	0.00	58.8
All Vehicles			1663	10.6	1663	10.6	0.732	5.0	NA	5.6	46.7	0.26	0.36	0.49	54.0

2028 No Build – Rail Crossing

MOVEMENT SUMMARY

Site: [1 (3)] 2028_no build_AM_NewEnglandHwy/SandyCreekRd (No Build)
Network: [3] 2028_no build_AM (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.416	2.2	LOS A	-[N7]	-[N7]	0.28	0.35	0.39	56.6
3	R2	All MCs	225	9.3	225	9.3	0.416	10.9	LOS A	-[N7]	-[N7]	0.59	0.74	0.83	48.1
Approach			732	13.7	732	13.7	0.416	4.9	NA	-[N7]	-[N7]	0.38	0.47	0.53	54.8
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.233	9.2	LOS A	0.7	7.8	0.75	0.91	0.83	35.7
6	R2	All MCs	13	25.0	13	25.0	0.233	50.0	LOS D	0.7	7.8	0.75	0.91	0.83	36.2
Approach			61	41.4	61	41.4	0.233	17.6	LOS B	0.7	7.8	0.75	0.91	0.83	35.8
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.346	5.8	LOS A	-[N7]	-[N7]	0.00	0.04	0.00	59.1
8	T1	All MCs	565	11.5	565	11.5	0.346	0.1	LOS A	-[N7]	-[N7]	0.00	0.04	0.00	59.4
Approach			602	11.5	602	11.5	0.346	0.5	NA	-[N7]	-[N7]	0.00	0.04	0.00	59.4
All Vehicles			1395	14.0	1395	14.0	0.416	3.5	NA	-[N7]	-[N7]	0.23	0.30	0.31	56.1

MOVEMENT SUMMARY

Site: [2 (4)] 2028_no build_AM_SandyCreekRoadRLC (No Build)
Network: [3] 2028_no build_AM (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
Approach			61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
West: Sandy Creek Road															
11	T1	All MCs	262	9.6	262	9.6	* 0.177	25.9	LOS B	32.2[N8]	244.1[N8]	0.24	0.22	0.24	33.8
Approach			262	9.6	262	9.6	0.177	25.9	LOS B	32.2[N8]	244.1[N8]	0.24	0.22	0.24	33.8
All Vehicles			323	15.6	323	15.6	0.177	25.3	LOS B	32.2[N8]	244.1[N8]	0.24	0.21	0.24	33.8

MOVEMENT SUMMARY

Site: [1 (4)] 2028_no build_PM_NewEnglandHwy/SandyCreekRd (No Build)
Network: [4] 2028_no build_PM (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.385	0.9	LOS A	1.2	9.4	0.13	0.15	0.15	58.8
3	R2	All MCs	58	36.4	58	36.4	0.385	10.5	LOS A	1.2	9.4	0.20	0.23	0.23	56.5
Approach			819	8.1	819	8.1	0.385	1.5	NA	1.2	9.4	0.13	0.16	0.16	58.7
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.549	9.4	LOS A	2.9	23.4	0.73	1.06	1.23	39.3
6	R2	All MCs	40	7.9	40	7.9	0.549	43.1	LOS D	2.9	23.4	0.73	1.06	1.23	39.1
Approach			262	9.2	262	9.2	0.549	14.5	LOS B	2.9	23.4	0.73	1.06	1.23	39.3
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.292	6.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.6
8	T1	All MCs	487	10.6	487	10.6	0.292	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			500	11.2	500	11.2	0.292	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles			1581	9.3	1581	9.3	0.549	3.3	NA	2.9	23.4	0.19	0.26	0.28	56.2

MOVEMENT SUMMARY

Site: [2 (3)] 2028_no build_PM_SandyCreekRoadRLC (No Build)
Network: [4] 2028_no build_PM (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h]	Demand Flows [HV %]	Arrival Flows [Total veh/h]	Arrival Flows [HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh]	95% Back Of Queue [Dist m]	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	262	9.2	262	9.2	* 0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
Approach			262	9.2	262	9.2	0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
West: Sandy Creek Road															
11	T1	All MCs	71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
Approach			71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
All Vehicles			333	14.9	333	14.9	0.176	25.3	LOS B	32.2	243.2	0.24	0.21	0.24	33.1

2028 Build – Rail Crossing

MOVEMENT SUMMARY

Site: [1 (5)] 2028_build_AM_NewEnglandHwy/SandyCreekRd (Build)
Network: [5] 2028_build_AM (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h]	Demand Flows [HV %]	Arrival Flows [Total veh/h]	Arrival Flows [HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh]	95% Back Of Queue [Dist m]	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.481	2.5	LOS A	-[N7]	-[N7]	0.26	0.34	0.41	56.4
3	R2	All MCs	281	12.4	281	12.4	0.481	12.1	LOS A	-[N7]	-[N7]	0.66	0.86	1.04	45.8
Approach			787	14.4	787	14.4	0.481	5.9	NA	-[N7]	-[N7]	0.40	0.53	0.64	53.7
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.327	10.9	LOS A	1.0	12.8	0.78	0.97	0.97	33.4
6	R2	All MCs	14	30.8	14	30.8	0.327	66.5	LOS E	1.0	12.8	0.78	0.97	0.97	33.9
Approach			76	52.8	76	52.8	0.327	20.9	LOS B	1.0	12.8	0.78	0.97	0.97	33.5
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.352	5.8	LOS A	-[N7]	-[N7]	0.00	0.05	0.00	58.9
8	T1	All MCs	565	11.5	565	11.5	0.352	0.1	LOS A	-[N7]	-[N7]	0.00	0.05	0.00	59.3
Approach			614	11.5	614	11.5	0.352	0.6	NA	-[N7]	-[N7]	0.00	0.05	0.00	59.3
All Vehicles			1477	15.2	1477	15.2	0.481	4.5	NA	-[N7]	-[N7]	0.25	0.35	0.39	55.0

MOVEMENT SUMMARY

Site: [2 (5)] 2028_build_AM_SandyCreekRoadRLC (Build)
Network: [5] 2028_build_AM (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h]	Demand Flows [HV %]	Arrival Flows [Total veh/h]	Arrival Flows [HV %]	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh]	95% Back Of Queue [Dist m]	Prop. Queued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
Approach			76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
West: Sandy Creek Road															
11	T1	All MCs	329	12.1	329	12.1	* 0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
Approach			329	12.1	329	12.1	0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
All Vehicles			405	19.7	405	19.7	0.225	26.4	LOS B	42.5[NB]	328.2[NB]	0.25	0.22	0.25	33.2

MOVEMENT SUMMARY

Site: [1 (6)] 2028_build_PM_NewEnglandHwy/SandyCreekRd (Build)
Network: [6] 2028_build_PM (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.386	1.1	LOS A	-[N7]	-[N7]	0.16	0.18	0.18	58.5
3	R2	All MCs	72	48.5	72	48.5	0.386	11.2	LOS A	-[N7]	-[N7]	0.25	0.28	0.28	55.6
Approach			833	9.6	833	9.6	0.386	2.0	NA	-[N7]	-[N7]	0.17	0.19	0.19	58.3
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.732	13.2	LOS A	5.2	43.3	0.83	1.30	1.87	35.7
6	R2	All MCs	52	8.2	52	8.2	0.732	53.4	LOS D	5.2	43.3	0.83	1.30	1.87	35.6
Approach			329	11.8	329	11.8	0.732	19.5	LOS B	5.2	43.3	0.83	1.30	1.87	35.7
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.287	6.1	LOS A	-[N7]	-[N7]	0.00	0.02	0.00	59.6
8	T1	All MCs	487	10.6	487	10.6	0.287	0.1	LOS A	-[N7]	-[N7]	0.00	0.02	0.00	59.7
Approach			501	11.3	501	11.3	0.287	0.3	NA	-[N7]	-[N7]	0.00	0.02	0.00	59.7
All Vehicles			1663	10.6	1663	10.6	0.732	4.9	NA	5.2	43.3	0.25	0.36	0.47	54.5

MOVEMENT SUMMARY

Site: [2 (6)] 2028_build_PM_SandyCreekRoadRLC (Build)
Network: [6] 2028_build_PM (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	329	11.8	329	11.8	* 0.234	27.4	LOS B	42.8	330.3	0.26	0.24	0.26	31.7
Approach			329	11.8	329	11.8	0.234	27.4	LOS B	42.8	330.3	0.26	0.24	0.26	31.7
West: Sandy Creek Road															
11	T1	All MCs	85	46.9	85	46.9	0.071	23.5	LOS B	9.5[N8]	93.5[N8]	0.22	0.19	0.22	35.2
Approach			85	46.9	85	46.9	0.071	23.5	LOS B	9.5[N8]	93.5[N8]	0.22	0.19	0.22	35.2
All Vehicles			415	19.0	415	19.0	0.234	26.6	LOS B	42.8[N8]	330.3[N8]	0.25	0.23	0.25	32.4

2028 No Build – Intersection Upgrade

MOVEMENT SUMMARY

Site: [3] 2028_no build_AM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	225	9.3	225	9.3	0.364	11.6	LOS A	1.8	14.1	0.65	0.92	0.84	42.2
Approach			732	13.7	732	13.7	0.364	3.7	NA	1.8	14.1	0.20	0.28	0.26	55.3
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.112	10.1	LOS A	0.4	4.3	0.61	0.81	0.61	41.3
6	R2	All MCs	13	25.0	13	25.0	0.216	67.5	LOS E	0.5	4.8	0.94	0.99	1.00	19.2
Approach			61	41.4	61	41.4	0.216	22.0	LOS B	0.5	4.8	0.67	0.85	0.69	33.3
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.022	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			602	11.5	602	11.5	0.323	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.3
All Vehicles			1395	14.0	1395	14.0	0.364	3.1	NA	1.8	14.1	0.13	0.20	0.17	56.1

MOVEMENT SUMMARY

Site: [3 (2)] 2028_no build_PM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	58	36.4	58	36.4	0.100	10.4	LOS A	0.4	3.9	0.56	0.78	0.56	43.2
Approach			819	8.1	819	8.1	0.413	0.9	NA	0.4	3.9	0.04	0.05	0.04	58.8
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.322	7.9	LOS A	1.4	11.3	0.57	0.81	0.68	45.1
6	R2	All MCs	40	7.9	40	7.9	0.505	64.7	LOS E	1.5	11.6	0.95	1.05	1.24	19.9
Approach			262	9.2	262	9.2	0.505	16.6	LOS B	1.5	11.6	0.63	0.85	0.76	37.8
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.009	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	48.1
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			500	11.2	500	11.2	0.276	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.6
All Vehicles			1581	9.3	1581	9.3	0.505	3.3	NA	1.5	11.6	0.12	0.17	0.15	55.9

MOVEMENT SUMMARY

Site: [3 (4)] 2028_build_AM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	281	12.4	281	12.4	0.477	13.3	LOS A	2.7	22.2	0.70	1.00	1.05	40.8
Approach			787	14.4	787	14.4	0.477	4.8	NA	2.7	22.2	0.25	0.36	0.38	53.9
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.157	11.0	LOS A	0.5	6.8	0.64	0.83	0.64	40.0
6	R2	All MCs	14	30.8	14	30.8	0.310	92.3	LOS F	0.7	7.0	0.95	1.01	1.07	15.5
Approach			76	52.8	76	52.8	0.310	25.7	LOS B	0.7	7.0	0.69	0.86	0.71	31.1
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.029	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.5
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			614	11.5	614	11.5	0.323	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles			1477	15.2	1477	15.2	0.477	4.1	NA	2.7	22.2	0.17	0.25	0.24	54.8

MOVEMENT SUMMARY

Site: [3 (3)] 2028_build_PM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	72	48.5	72	48.5	0.136	11.3	LOS A	0.5	6.1	0.58	0.81	0.58	42.4
Approach			833	9.6	833	9.6	0.413	1.1	NA	0.5	6.1	0.05	0.07	0.05	58.5
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.414	8.9	LOS A	2.1	17.6	0.61	0.88	0.82	44.0
6	R2	All MCs	52	8.2	52	8.2	0.687	82.4	LOS F	2.2	17.4	0.97	1.12	1.50	17.0
Approach			329	11.8	329	11.8	0.687	20.4	LOS B	2.2	17.6	0.66	0.91	0.93	35.2
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.010	6.0	LOS A	0.0	0.0	0.00	0.57	0.00	48.0
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			501	11.3	501	11.3	0.276	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles			1663	10.6	1663	10.6	0.687	4.7	NA	2.2	17.6	0.16	0.22	0.21	54.4

2028 No Build – Rail Crossing and Intersection Upgrade

MOVEMENT SUMMARY

Site: [3] 2028_no build_AM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Network: [3 (2)] 2028_no build_AM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	225	9.3	225	9.3	0.364	11.6	LOS A	-[N7]	-[N7]	0.65	0.92	0.84	43.7
Approach			732	13.7	732	13.7	0.364	3.7	NA	-[N7]	-[N7]	0.20	0.28	0.26	56.0
East: Sandy Creek Rd															
4	L2	All MCs	48	45.7	48	45.7	0.112	10.1	LOS A	0.3	4.1	0.61	0.81	0.61	41.3
6	R2	All MCs	13	25.0	13	25.0	0.216	67.3	LOS E	0.5	4.6	0.94	0.99	1.00	19.2
Approach			61	41.4	61	41.4	0.216	21.9	LOS B	0.5	4.6	0.67	0.85	0.69	33.4
North: New England Hwy															
7	L2	All MCs	37	11.4	37	11.4	0.022	5.7	LOS A	-[N7]	-[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			602	11.5	602	11.5	0.323	0.5	NA	-[N7]	-[N7]	0.00	0.04	0.00	59.5
All Vehicles			1395	14.0	1395	14.0	0.364	3.1	NA	-[N7]	-[N7]	0.13	0.20	0.17	56.5

MOVEMENT SUMMARY

Site: [2 (4)] 2028_no build_AM_SandyCreekRoadRLC (No Build)
Network: [3 (2)] 2028_no build_AM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
Approach			61	41.4	61	41.4	0.049	23.1	LOS B	6.7	63.5	0.21	0.18	0.21	34.2
West: Sandy Creek Road															
11	T1	All MCs	262	9.6	262	9.6	*0.177	25.9	LOS B	32.2[N8]	244.1[N8]	0.24	0.22	0.24	33.8
Approach			262	9.6	262	9.6	0.177	25.9	LOS B	32.2[N8]	244.1[N8]	0.24	0.22	0.24	33.8
All Vehicles			323	15.6	323	15.6	0.177	25.3	LOS B	32.2[N8]	244.1[N8]	0.24	0.21	0.24	33.8

MOVEMENT SUMMARY

Site: [3 (2)] 2028_no build_PM_Upgrade NewEnglandHwy/SandyCreekRd (No Build)
Network: [4 (2)] 2028_no build_PM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	58	36.4	58	36.4	0.189	10.8	LOS A	0.4	4.2	0.59	0.81	0.61	44.9
Approach			819	8.1	819	8.1	0.413	0.9	NA	0.4	4.2	0.04	0.06	0.04	59.0
East: Sandy Creek Rd															
4	L2	All MCs	222	9.5	222	9.5	0.322	7.9	LOS A	1.3	10.6	0.54	0.83	0.64	45.1
6	R2	All MCs	40	7.9	40	7.9	0.505	63.7	LOS E	1.4	10.9	0.95	1.04	1.22	20.1
Approach			262	9.2	262	9.2	0.505	16.4	LOS B	1.4	10.9	0.61	0.86	0.73	37.9
North: New England Hwy															
7	L2	All MCs	13	33.3	13	33.3	0.017	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			500	11.2	500	11.2	0.276	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles			1581	9.3	1581	9.3	0.505	3.3	NA	1.4	10.9	0.12	0.18	0.14	56.1

MOVEMENT SUMMARY

Site: [2 (3)] 2028_no build_PM_SandyCreekRoadRLC (No Build)
Network: [4 (2)] 2028_no build_PM - Upgrade NEH/SCR (2028_no build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	262	9.2	262	9.2	* 0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
Approach			262	9.2	262	9.2	0.176	25.9	LOS B	32.2	243.2	0.24	0.22	0.24	32.5
West: Sandy Creek Road															
11	T1	All MCs	71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
Approach			71	35.8	71	35.8	0.055	23.2	LOS B	7.8	71.1	0.21	0.18	0.21	35.4
All Vehicles			333	14.9	333	14.9	0.176	25.3	LOS B	32.2	243.2	0.24	0.21	0.24	33.1

2028 Build – Rail Crossing and Intersection Upgrade

MOVEMENT SUMMARY

Site: [3 (4)] 2028_build_AM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Network: [5 (2)] 2028_build_AM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	506	15.6	506	15.6	0.300	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	281	12.4	281	12.4	0.477	13.3	LOS A	[N7]	[N7]	0.70	1.00	1.05	42.1
Approach			787	14.4	787	14.4	0.477	4.8	NA	[N7]	[N7]	0.25	0.36	0.38	54.7
East: Sandy Creek Rd															
4	L2	All MCs	62	57.6	62	57.6	0.157	11.0	LOS A	0.5	6.4	0.64	0.83	0.64	40.0
6	R2	All MCs	14	30.8	14	30.8	0.310	91.7	LOS F	0.6	6.6	0.95	1.01	1.06	15.6
Approach			76	52.8	76	52.8	0.310	25.6	LOS B	0.6	6.6	0.69	0.86	0.71	31.2
North: New England Hwy															
7	L2	All MCs	48	10.9	48	10.9	0.029	5.7	LOS A	[N7]	[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	565	11.5	565	11.5	0.323	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			614	11.5	614	11.5	0.323	0.5	NA	[N7]	[N7]	0.00	0.05	0.00	59.4
All Vehicles			1477	15.2	1477	15.2	0.477	4.1	NA	[N7]	[N7]	0.17	0.25	0.24	55.3

MOVEMENT SUMMARY

Site: [2 (5)] 2028_build_AM_SandyCreekRoadRLC (Build)
Network: [5 (2)] 2028_build_AM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
Approach			76	52.8	76	52.8	0.065	23.4	LOS B	8.4	85.7	0.22	0.18	0.22	34.0
West: Sandy Creek Road															
11	T1	All MCs	329	12.1	329	12.1	* 0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
Approach			329	12.1	329	12.1	0.225	27.1	LOS B	42.5[NB]	328.2[NB]	0.25	0.23	0.25	33.1
All Vehicles			405	19.7	405	19.7	0.225	26.4	LOS B	42.5[NB]	328.2[NB]	0.25	0.22	0.25	33.2

MOVEMENT SUMMARY

Site: [3 (3)] 2028_build_PM_Upgrade NewEnglandHwy/SandyCreekRd (Build)
Network: [6 (2)] 2028_build_PM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New England Hwy / Sandy Creek Rd (Post Upgrade)
Site Category: (None)
Give-Way (Two-Way)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
South: New England Hwy															
2	T1	All MCs	761	5.9	761	5.9	0.413	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
3	R2	All MCs	72	48.5	72	48.5	0.136	11.3	LOS A	-[N7]	-[N7]	0.58	0.81	0.58	44.5
Approach			833	9.6	833	9.6	0.413	1.1	NA	-[N7]	-[N7]	0.05	0.07	0.05	58.8
East: Sandy Creek Rd															
4	L2	All MCs	278	12.5	278	12.5	0.414	8.8	LOS A	2.0	16.4	0.59	0.88	0.78	44.1
6	R2	All MCs	52	8.2	52	8.2	0.687	80.4	LOS F	2.1	16.2	0.97	1.11	1.46	17.2
Approach			329	11.8	329	11.8	0.687	20.0	LOS B	2.1	16.4	0.65	0.92	0.89	35.5
North: New England Hwy															
7	L2	All MCs	14	38.5	14	38.5	0.010	6.0	LOS A	-[N7]	-[N7]	0.00	0.57	0.00	50.9
8	T1	All MCs	487	10.6	487	10.6	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			501	11.3	501	11.3	0.276	0.2	NA	-[N7]	-[N7]	0.00	0.02	0.00	59.7
All Vehicles			1663	10.6	1663	10.6	0.687	4.6	NA	-[N7]	-[N7]	0.15	0.22	0.20	54.6

MOVEMENT SUMMARY

Site: [2 (6)] 2028_build_PM_SandyCreekRoadRLC (Build)
Network: [6 (2)] 2028_build_PM - Upgrade NEH/SCR (2028_build)
Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 1200.0 seconds (Site User-Given Phase Times)
Network Scenario: 1 | Local Volumes **Site Scenario: 1 | Local Volumes**

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed km/h
East: Sandy Creek Road															
5	T1	All MCs	329	11.8	329	11.8	* 0.225	27.1	LOS B	42.4	327.2	0.25	0.23	0.25	31.8
Approach			329	11.8	329	11.8	0.225	27.1	LOS B	42.4	327.2	0.25	0.23	0.25	31.8
West: Sandy Creek Road															
11	T1	All MCs	85	46.9	85	46.9	0.071	23.5	LOS B	9.5[NB]	93.5[NB]	0.22	0.19	0.22	35.2
Approach			85	46.9	85	46.9	0.071	23.5	LOS B	9.5[NB]	93.5[NB]	0.22	0.19	0.22	35.2
All Vehicles			415	19.0	415	19.0	0.225	26.4	LOS B	42.4[NB]	327.2[NB]	0.25	0.22	0.25	32.5

Appendix C

OSOM Route Assessment

McCullys Gap Battery Energy Storage System

OSOM Route Assessment

August 2026



Summary

Background

Muswellbrook Pro Unit Holdings Pty Ltd is proposing the McCullys Gap Battery Energy Storage System (BESS) (referred to as 'the project') in McCullys Gap, NSW. The project is located on parts of 380 and 578 Sandy Creek Road, McCullys Gap, NSW, six kilometres north-east of Muswellbrook (the project area). The project is located within the Muswellbrook Shire local government area and is located in the Hunter-Central Coast Renewable Energy Zone.

This report identifies and assesses the proposed concept level route for oversize overmass (OSOM) vehicles associated with the project in accordance with the requirements of the Planning Secretary's Environmental Assessment Requirements (the SEARs).

OSOM route assessment

A concept-level assessment of the proposed OSOM route has been undertaken to confirm the feasibility of transporting the project's high-risk OSOM vehicle. The route has been aligned with EnergyCo's planned Port to Renewable Energy Zones (Port to REZ) transport corridor, utilising existing major State highways and approved OSOM routes, including sections of the New England Highway (A43/A15) and Golden Highway (B84), with minor connecting roads used to access the project area.

The assessment considered key constraints along the route, including road geometry, intersections, structural elements, railway level crossings, vertical clearances and existing roadside infrastructure. Swept path analysis was undertaken at all critical turning locations to verify that the OSOM vehicle can safely navigate these areas.

Consultation with EnergyCo confirms that the project's OSOM vehicle configuration falls within the design envelope adopted for the Port to REZ upgrades. As the project vehicle is smaller in both length and width than the EnergyCo design vehicle, no additional route upgrades are required along most of the identified route. Some minor upgrades are required along Sandy Creek Road.

Conclusion

The assessment concludes that transport of the project transformer to the project area is feasible. Localised constraints have been identified at specific locations, which are expected to be managed through a limited range of standard, temporary OSOM treatments during delivery. These may include temporary road widening using gravel, removal and reinstatement of signage and guardrails at selected locations, controlled median or kerb traversals, and coordination with relevant authorities (including ARTC at railway level crossings), together with standard OSOM traffic control measures such as escort vehicles and temporary traffic management.

The detail of these measures, along with final route confirmation and access conditions, will be progressed during detailed OSOM transport planning and the National Heavy Vehicle Regulator (NHVR) permitting process, following project approval. This will be undertaken in consultation with Transport for NSW, Muswellbrook Shire Council, ARTC, EnergyCo and the NHVR to ensure all approvals, consents and controls are in place prior to haulage.

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Appendices

Appendix A Swept Path Assessment
Appendix B Swept Path Drawings

Glossary and abbreviations

Abbreviation/term	Definition
ARTC	Australian Rail Track Corporation
AS	Australian Standard
BESS	Battery Energy Storage System
DPHI	NSW Department of Planning, Housing and Infrastructure.
EIS	Environmental impact statement
EnergyCo	Energy Corporation of NSW, responsible for delivery of REZ network infrastructure and the Port-to-REZ (P2R) enabling works.
EP&A Act	*Environmental Planning and Assessment Act 1979*
HV	High Voltage
Km/h	Kilometres per hour
Lat/Long	Latitude and longitude coordinates used to identify precise location of intersections, structures and pinch points.
MW	Megawatt
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
OSOM	Oversize overmass vehicle – a heavy vehicle that exceeds standard mass or dimension limits (including gross mass, axle mass or overall dimensions).
OSOM stroke	The longitudinal extension capability of an extendable trailer or trailer component, representing the distance over which the trailer can be lengthened to accommodate an OSOM load.
Project	Construction, operation and decommissioning of the McCullys Gap Battery Energy Storage System (BESS).
Project area	The area required to construct and operate the project.
REZ	Renewable Energy Zone
SEARs	Secretary's environmental assessment requirements
SIXMAPS	NSW Government cadastral and topographic mapping platform used to confirm land boundaries.
SSD	State significant development
Swept path assessment	Vehicle tracking analysis used to determine OSOM manoeuvrability at intersections, curves and constrained road sections.
Transport for NSW	Transport for New South Wales

1. Introduction

1.1 Project location and key features

Muswellbrook Pro Unit Holdings Pty Ltd (the applicant) is proposing the McCullys Gap Battery Energy Storage System (BESS) on parts of 380 and 578 Sandy Creek Road, McCullys Gap, NSW, six kilometres north-east of Muswellbrook (the project area). The project is located within the Muswellbrook Shire local government area and is located in the Hunter-Central Coast Renewable Energy Zone.

The key features of the project include:

- a 400 megawatt (MW) battery energy storage system (including batteries, inverters, transformers, and switch-gear) for up to approximately four hours of storage (equating to 1,600 MWh)
- infrastructure to connect the BESS to the existing high voltage electricity network including:
  - project substation
  - connection to the Muswellbrook 330kV substation
  - upgrades to the existing Muswellbrook 330 kV substation to accommodate the BESS
- ancillary and associated works including:
  - operations and maintenance facilities
  - road works and access tracks
  - stormwater management basin
  - asset protection zones.

Further information on the project's features and indicative construction methodology, including those components of the project design relevant to traffic and transport, is provided in Chapter 3 (Project description) of the EIS.

1.2 Purpose and scope of this document

This report provides a concept level route analysis for high risk oversize overmass (OSOM) vehicles required during construction of the project. This will include the transportation of a transformer which is expected to be the largest load transported to the project area.

This assessment has been prepared to assess the feasibility of transporting large and heavy project components from the port of entry to the project area using the existing road network. The assessment considers the physical constraints of the proposed transport route, including road geometry, intersections, structures and roadside infrastructure, and identifies any required mitigation measures to enable safe and efficient OSOM movements.

This report forms an appendix to the Traffic and Transport Impact Assessment prepared in support of an application for approval of the project in accordance with Division 4.7 of the *Environmental Planning & Assessment Act 1979* (NSW).

1.3 Assumptions

General design assumptions adopted in this assessment are outlined in the Table 1.1.

Table 1.1 General design and report assumptions

Assumption	Comment
Design speed	The design vehicle is assumed to be travelling at average speed of 15 km/h and slowing down to average 5 km/h at corners and over bridges.
Traffic control	The design vehicle is assumed to be travelling under traffic control including a contingent of escort vehicles and co-pilots travelling in front of and at rear of the vehicles.
Temporary works	Works are generally temporary and would not be open to public traffic – only used by design vehicle (opened under traffic management on the day of the move).
Retained infrastructure	Any retained infrastructure (bridges, culvert crossings, rail crossing, kerb, median islands etc) that will be trafficked, has not been structurally assessed. Structures are subject to condition inspections (to assess structural integrity of structure) and pre and post dilapidation survey to rectify any damage.
Design vehicle and load	Adopted design vehicle and design loads are discussed in section 2.
Vehicle tracking software	AutoTurn (Transoft Solutions) software have been utilised for the swept path assessment.
Overhead structures including bridge clearance, power lines and light poles overhang	Locations of overhead structures (e.g. underpass) have been identified as part of this preliminary desktop assessment. No overhead powerlines have been considered in scope. Detailed height clearance checks will be required to be undertaken as part of detailed route assessment and trip planning prior to construction.
Reliance on SIXMAPS for private property boundaries	SIXMAPS boundaries may differ from surveyed cadastral boundaries. Swept paths have been undertaken to avoid SIXMAPS lot boundaries or fencelines identified in Nearmaps Aerial.

2. OSOM vehicle details

2.1 Design vehicle specifications

The design vehicle has been selected to represent a conservative envelope for the delivery of the 330/33 kilovolt transformers to site. Two transformers would be delivered to the project area via two separate OSOM vehicle deliveries. Each transformer is assumed to have approximate dimensions of up to:

– 13.4 metres in length
– 4.88 metres in width
– 4.5 metres in height
– Weight of approximately 180 tonnes.

These dimensions are based on typical transport arrangements for large grid-connected BESS transformers, with radiators, bushings and ancillary equipment removed and transported separately. The weight of the transformer is the primary factor influencing the selection of the proposed OSOM vehicle.

The vehicle configuration has been selected to be consistent with the envelope used by Transport for NSW and EnergyCo for the Port to Renewable Energy Zones (REZ) enabling works. The final component dimensions and transport vehicle configuration will be confirmed during detailed design and construction planning and following selection of the preferred manufacturer.

The assumed OSOM vehicle details and configuration used to conduct the swept path assessment is presented in Figure 2.1. The overall dimensions of the OSOM vehicle are as follows:

– 65.8 metres in length
– 4.27 metres in width

The vehicle platform height typically ranges from 700-1000 millimetres. This will be confirmed by the transport logistics company at a later stage. Minor lateral overhang beyond the transport platform is anticipated and is considered acceptable, provided it remains within the approved OSOM envelope and is managed in accordance with Transport for NSW permit conditions.

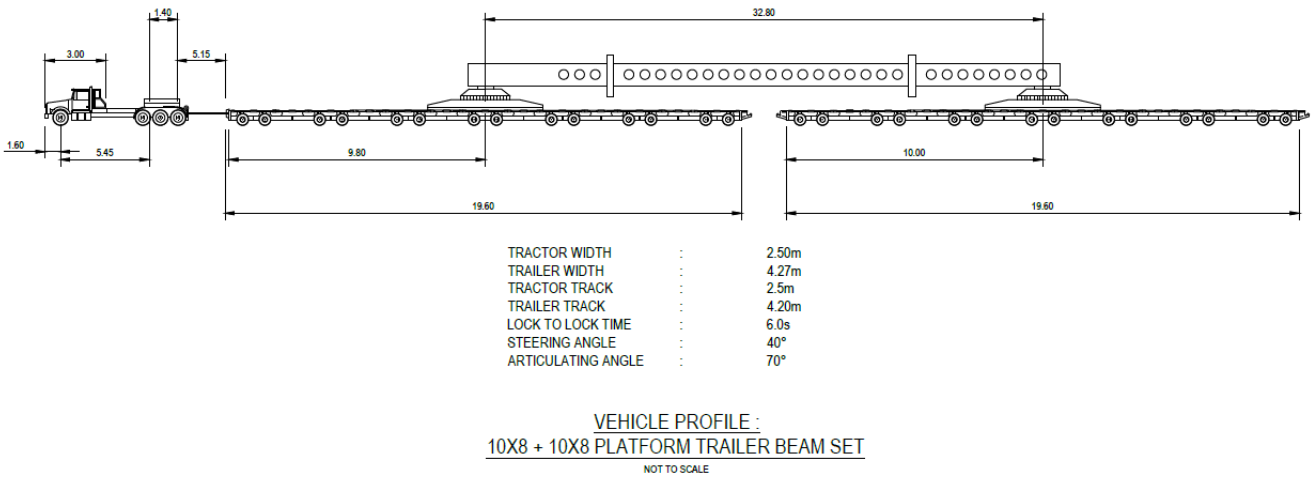


Figure 2.1 OSOM vehicle configuration

The above vehicle configuration was used to create a custom design vehicle which was loaded into AutoTURN to complete the swept path assessment along the designated OSOM vehicle route.

2.2 Vertical curve limit

Vertical geometric analysis has not been included in this assessment. However, any change in slope with a nominal radius of less than 400 metres should be levelled to facilitate safe and efficient operations. Where the vertical curve exceeds acceptable limits for the prevailing terrain, the use of suitable temporary levelling measures, such as wooden bog mats, or similar may be needed (Figure 2.2).

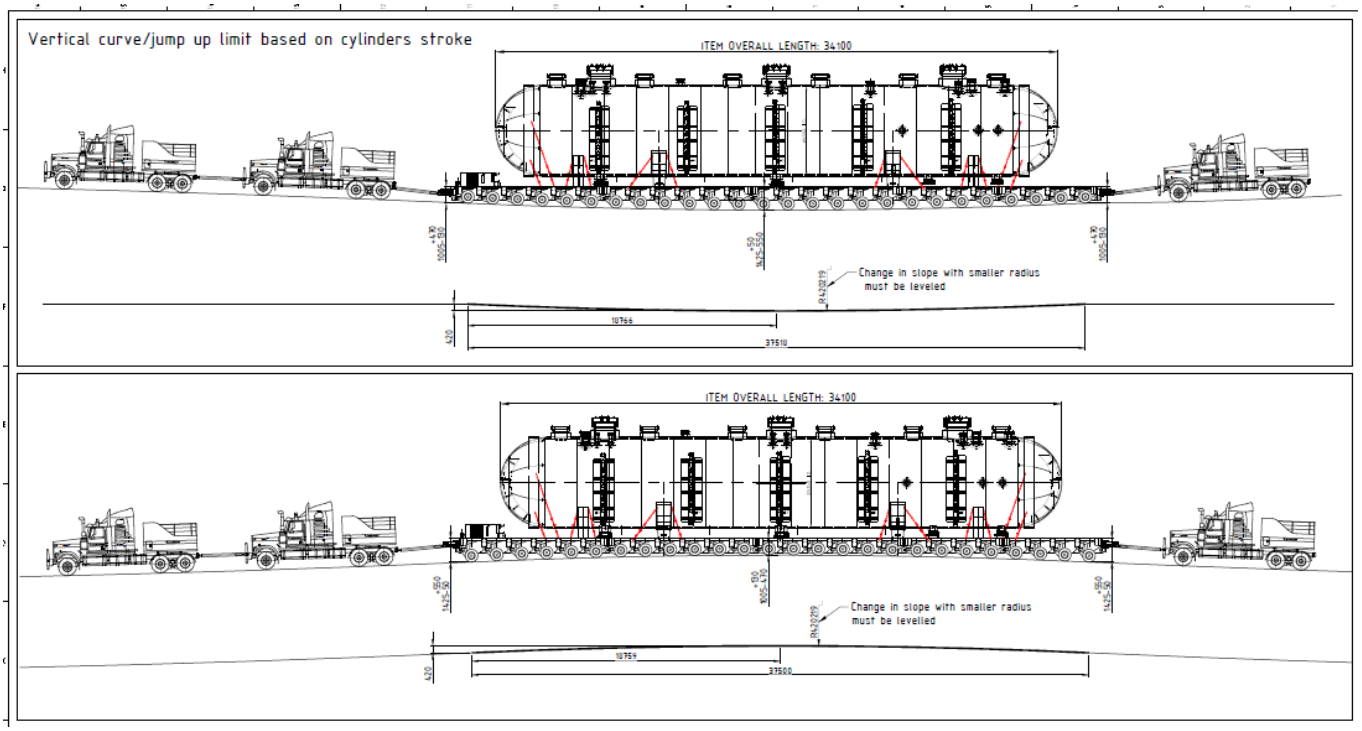


Figure 2.2 Vertical Curve Limit Diagram for OSOM

Where traffic islands and medians are lower than the proposed maximum OSOM vehicle stroke (420 millimetres), ramps or mats will likely be required ().

3. OSOM route assessment

3.1 Route development

To identify an appropriate route for the OSOM vehicle, the following constraints were considered:

– The point of origin for the delivery of OSOM components.
– The availability and suitability of existing and approved OSOM routes via review of the National Land Transport Network and NSW NHVR website, including any restrictions relevant to the project's OSOM loads and vehicle configuration.
– Planned or proposed OSOM route upgrades associated with other projects, including both potential constraints and opportunities for shared use.

3.2 Existing network context

The NSW NHVR website identifies approved Class 1 OSOM routes for vehicles up to 30 metres in length, 3.5 metres in width and 4.6 metres in height, with a gross vehicle mass of up to 49.5 tonnes. These routes typically align with key State and nationally significant corridors, including sections of the National Land Transport Network. The proposed OSOM vehicle transporting the transformer for the project exceeds these approved parameters. Accordingly, the movement cannot rely on access provided under existing NHVR Notices and will require assessment under the Heavy Vehicle National Law. In addition to NHVR assessment of the proposed OSOM route, approvals are required from the relevant road authorities, Transport for NSW for State roads and the applicable local councils for local roads, together with a Class 1 OSOM permit, any necessary road manager consents, and a Transport Management Plan outlining escort arrangements, traffic control measures and safety management requirements.

Based on the adopted vehicle configuration, the development of a feasible route was informed by a desktop assessment that focused on existing road carriageway configuration, vertical clearance constraints (including bridges and other structures), and swept-path turning analyses to confirm whether adequate turning radii could be achieved at critical intersections, with or without roadway modifications.

A desktop assessment of lane widths, shoulder conditions, and opposing vehicle passing feasibility was undertaken for the State road segments between Newcastle and Denman Road.

The New England Highway (A43/A15), Golden Highway (B84) and Jerrys Plains Road generally provide ≥ 3.5 metre lanes with sealed shoulders, enabling escorted opposing-traffic holds where required.

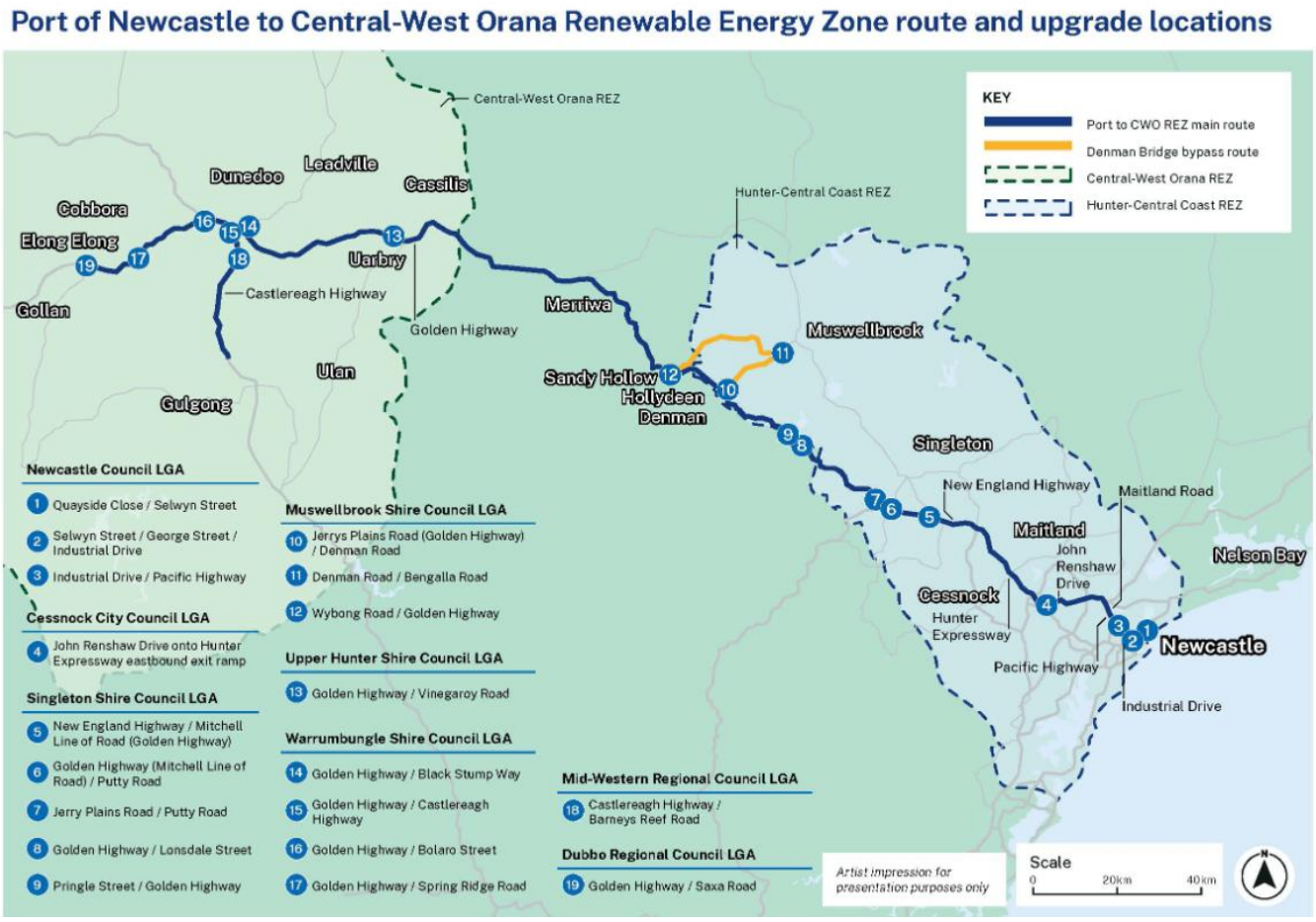
Using the design vehicle configuration, no locations were identified along the State road network where horizontal two-way passing would be infeasible for the indicative vehicle under controlled traffic conditions. Other route constraints remain subject to further assessment. Minor temporary traffic control (short-duration lane closures or rolling controls) is expected to be sufficient to manage opposing traffic during OSOM movements, which are likely to be undertaken outside of peak traffic periods. Narrower segments are limited to the Muswellbrook local road network (Wybong Road, Kayuga Road, Invermein Street, Stair Street, Sandy Creek Road).

Based on the desktop review conducted, passing feasibility is achievable along the full State-managed road network under escorted traffic control.

3.3 Port to REZ upgrades

EnergyCo is responsible for leading the delivery of REZs including the enabling infrastructure required to support them. The delivery of renewable projects within the REZs requires the transportation of oversize and heavy components (such as wind turbines and transformers) from their point of origin to the REZ.

EnergyCo is working in partnership with Transport for NSW to upgrade key intersections and address pinch points along the state road network in what is known as the "Port-to-REZ" road upgrade program, which includes the Hunter-Central Coast, New England and Central-West Orana REZs. The upgrade program includes targeted improvements at key intersections and pinch points, as well as associated works such as pavement widening, turning lane upgrades, and utility relocations, to accommodate the movement of oversize renewable energy infrastructure. The upgrade program is presented in Figure 3.1.



Source: Transport for NSW

Figure 3.1 Port of Newcastle to Central West Orana REZ route and upgrade locations

The first stage of the Port to Renewable Energy Zones (Port to REZ) program includes upgrades at 19 locations between the Port of Newcastle and Elong Elong in the Central-West Orana Renewable Energy Zone. OSOM movements to the Central-West Orana, Hunter-Central Coast and New England REZs share a common route from the Port of Newcastle to the Upper Hunter, before diverging towards their respective destinations.

OSOM vehicles travelling to the New England REZ are proposed to detour around Muswellbrook before re-joining the New England Highway (A15) and continuing north. Transport for NSW and EnergyCo have identified the Muswellbrook detour, via Wybong Road, Bengalla Road, Kayuga Road, Invermein Street, Stair Street and Dartbrook Private Mine Access Road, as a response to existing constraints on the State road network. The detour forms part of Stage 1B of the Port to REZ program and is the most advanced of the proposed detours, with a defined scope of works to support the transport of high-risk over-size over-mass components. This detour is considered to be a suitable OSOM route for the project (refer to section 3.4).

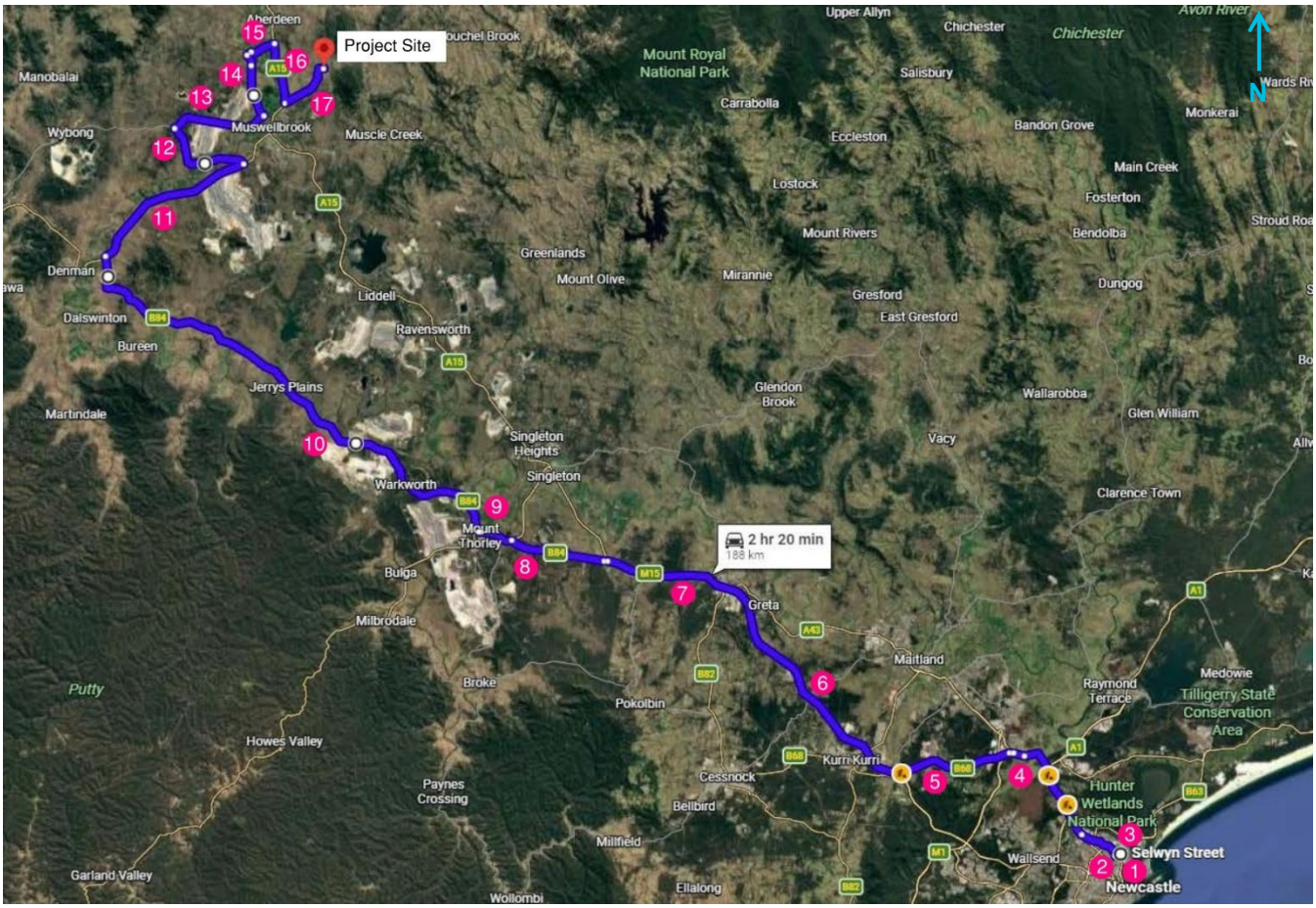
Given the dimensions of the OSOM vehicle, the most feasible transport route maximises use of the National Land Transport Network between the Port of Newcastle and the project area, while also utilising the designated Port-to-REZ routes. These routes predominantly comprise major highways and freeways, which are generally constructed to a high standard to accommodate freight movements and provide relatively uninterrupted travel. This approach minimises turning manoeuvres and reduces travel through built-up areas.

The applicant has consulted with EnergyCo in relation to the dimensions of their design vehicle used for the designation of the Port to REZ routes and identification of proposed road upgrades. The dimensions of the design vehicle proposed by EnergyCo is confirmed to be longer and wider than the OSOM vehicle proposed for the delivery of the transformer for the McCullys Gap BESS and therefore no additional upgrades will be required along this section of the OSOM route.

3.4 Proposed OSOM route

OSOM vehicles are expected to travel from the Port of Newcastle (Point of Origin) to the project area via the New England Highway (A34/A15) and Golden Highway (B84), a distance of approximately 188 kilometres.

This route is already being used by other major projects within the Hunter-Central Coast REZ and in the vicinity of the project area and is considered to present a low risk in terms of OSOM transport constraints. The proposed route is shown in Figure 3.2 and summarised in Table 3.1.



Source: Google Maps

Figure 3.2 Proposed route from the Port of Newcastle to the project area via New England Highway and Golden Highway

Table 3.1 Details of proposed OSOM route from the Port of Newcastle to the project area

No. (Refer Figure 3.2)	Proposed route section	Road authority	NHVR Approval Status	Included in Port to REZ Program	Swept Path Assessment Appendix Reference
1	Quayside Close / Selwyn Street	Newcastle Council	NHVR OSOM Approved for Class 1 vehicles access.	✓	N/A – upgrades delivered as part of EnergyCo's Port to REZ program
2	Selwyn Street / George Street / Industry Drive	Newcastle Council	NHVR OSOM Approved for Class 1 vehicles access.	✓	
3	Industry Drive / Maitland Road	Transport for NSW	Industry Drive is NHVR OSOM Approved for Class 1 vehicles access. Access to a portion of Maitland Road is Approved with conditions. NHVR requires that the Hexham Straight Widening Project team or Black Hill to Tomago Project team be contacted a minimum of five (5) days prior to the proposed travel date.	✓	
4	Maitland Road / New England Highway	Transport for NSW	Access to New England Highway is Approved with conditions. NHVR requires that Black Hill to Tomago Project team be contacted a minimum of five (5) days prior to the proposed travel date.	✓	
5	New England Highway / John Renshaw Drive	Transport for NSW	Access to both New England Highway and a portion of John Renshaw Drive is Approved with conditions. NHVR requires that Black Hill to Tomago Project team be contacted a minimum of five (5) days prior to the proposed travel date.	✓	
6	John Renshaw Drive into Hunter Expressway eastbound exit ramp	Transport for NSW	Hunter Expressway is Approved with conditions. NHVR states that vehicles or combinations exceeding 3.2 metres wide are not permitted to travel Monday to Friday from 5am to 9am and between 4pm to 6pm (except on state-wide public holidays).	✓	
7	Hunter Expressway / New England Highway	Transport for NSW	Access to both Hunter Expressway and New England Highway is Approved with Conditions. For both routes, NHVR states that vehicles or combinations exceeding 3.2 metres wide are not permitted to travel Monday to Friday from 5am to 9am and between 4pm to 6pm (except on state-wide public holidays).	✓	
8	New England Highway / Golden Highway (Mitchell Line of Road)	Transport for NSW	Access to Golden Highway is NHVR OSOM approved for Class 1 vehicles. Access to New England Highway is Approved with Conditions.	✓	
9	Golden Highway (Mitchell Line of Road) / Putty Road	Transport for NSW	Golden Highway and Putty Road are NHVR OSOM approved for Class 1 vehicles access.	✓	

No. (Refer Figure 3.2)	Proposed route section	Road authority	NHVR Approval Status	Included in Port to REZ Program	Swept Path Assessment Appendix Reference
10	Putty Road into Jerrys Plains Road via eastbound entry ramp	Transport for NSW	Access to proposed portion of the Putty Road is NHVR OSOM approved for Class 1 vehicles. Access to Jerry Plains Road is NHVR OSOM approved for Class 1 vehicles.	✓	
11	Jerrys Plains Road / Denman Road	Transport for NSW / Muswellbrook Shire Council	Access to Jerrys Plains Road and Denman Road are NHVR OSOM approved for Class 1 vehicles.	✓	
12	Denman Road / Bengalla Road	Muswellbrook Shire Council	Access to Denman Road is NHVR OSOM approved for Class 1 vehicles. Bengalla Road is **not** NHVR approved for access by Class 1 vehicles.	✓	
13	Bengalla Road / Wybong Road	Muswellbrook Shire Council	Both Bengalla Road and Wybong Road are **not** NHVR approved for Class 1 vehicles access.	✓1	
14	Wybong Road / Kayuga Road	Muswellbrook Shire Council	Both Wybong Road and Kayuga Road are **not** NHVR approved for Class 1 vehicles access.	✓1	
15	Kayuga Road / Invermein Street / Stair Street / Dartbrook Mine Private Access Road	Muswellbrook Shire Council	Kayuga Road, Invermein Street, Stair St and unnamed Road are **not** NHVR approved for Class 1 vehicles access.	✓1	
16	Dartbrook Mine Private Access Road / New England Highway	Muswellbrook Shire Council / Transport for NSW	Unnamed Road is not NHVR approved for Class 1 vehicles access. New England Highway is NHVR OSOM approved for Class 1 vehicles access.	✓1	
17	New England Highway / Sandy Creek Road	Transport for NSW / Muswellbrook Shire Council	New England Highway is NHVR OSOM approved for Class 1 vehicles access. Sandy Creek Road is **not** NHVR OSOM approved for Class 1 vehicles access. Restricted access vehicles are not permitted to travel on Sandy Creek Road between 7.30am and 8.30am and 3.45pm and 4.45pm on school days.	-	A-2-1 A-2-2 A-2-3 A-2-4
Project area	Sandy Creek Road / Project area	Muswellbrook Shire Council	Sandy Creek Road is not NHVR OSOM approved for Class 1 vehicles access.	-	A-2-5

Notes:
✓1 : TfNSW and Energy Co have released an update letter "*Re: State Road Upgrades between Port of Newcastle and the Central-West Orana Renewable Energy Zone and the New England Renewable Energy Zone*"dated 18th December 2024. The letter states that the detour route around Muswellbrook can be treated as an NSW Government commitment which can be taken into account by DPHI when assessing and determining applicable renewable generation projects.

The proposed route between Dartbrook Mine Private Access Road / New England Highway and the project area, presented in Figure 3.2, is not approved as an NHVR OSOM route and is not part of the Port to REZ upgrades program. As such, a swept path assessment has been undertaken to identify infrastructure constraints along the route.

4. Findings

4.1 General

OSOM vehicle movements for the transformer delivery will require targeted management to ensure safe, compliant and low-impact transport from the Port of Newcastle to the project area. The measures outlined below respond to:

- swept path constraints
- local road limitations
- height restrictions
- railway level crossing interactions
- temporary works required for turning movements
- approvals and conditions from NHVR, Transport for NSW and Muswellbrook Shire Council.

These measures ensure OSOM movements can be safely accommodated with minimal, temporary and reversible impacts on the transport network.

It is noted that should loads exceed 5.2 metres height and within 200 millimetres of an overhead structure (trees, underpasses, bridges), this will require a traffic management plan to assess that the movements are carried out without causing damage to overhead structures.

Pilot and escort vehicles will be required along the full length of the proposed route to manage traffic interactions with the OSOM convoy, including vehicles travelling in the same and opposing directions. The proposed transformer OSOM movement may occur outside standard construction hours and peak traffic periods to minimise impacts on the surrounding road network.

According to the NHVR Portal, OSOM movements require advance notification to the relevant road authorities and compliance with existing operational constraints. Certain sections of the network have established time-of-day restrictions for vehicles wider than 3.2 metres, which can be managed through scheduling and are not expected to require changes.

Within the Muswellbrook local road network, several roads along the proposed OSOM route are not currently approved for the required OSOM vehicle dimensions. Further consultation with Muswellbrook Shire Council will be undertaken as required to confirm access arrangements for locally managed roads and ensure OSOM vehicle movements are appropriately planned and authorised.

Other OSOM movements associated with the transport of ancillary equipment and materials are expected to comprise low-risk OSOM vehicles that can travel independently to site and do not require approval from the NHVR. All other OSOM movements are anticipated to present a substantially lower level of risk by comparison and are not assessed as part of this report.

4.2 Constraints

A swept path assessment has been undertaken for the critical turning movements along the proposed OSOM route. With the exception of sections that form part of the Port-to-REZ enabling works program led by EnergyCo, the assessment confirms that no permanent road or intersection upgrades are required to facilitate the project's OSOM movements. Where constraints have been identified, they are limited to minor, localised and temporary measures only, such as temporary removal and reinstatement of roadside furniture (for example, signage or guideposts), localised pavement widening using gravel, or controlled kerb or median traversals under traffic management.

The necessary works are presented in Appendix A and swept path drawings in Appendix B. The constraints and mitigation approach identified for the proposed OSOM route are summarised in Table 4.1.

Table 4.1 Proposed OSOM Route – summary of key constraints and locations

Swept path location	Identified constraint	Mitigation approach
New England Highway onto Sandy Creek Road and over Main North Rail line	Insufficient road width Interface with road barrier (W-Beam) Insufficient signage clearance (rail crossing signal)	Temporary gravel pavement to be placed. Road barrier modification. Temporary signage removal and reinstatement.
Sandy Creek Road at lat/long coordinate: -32.219037, 150.937106	Insufficient road width	Temporary gravel pavement to be placed.
Sandy Creek Road at lat/long coordinate: -32.216381, 150.936222	Insufficient road width	Temporary gravel pavement to be placed.
Sandy Creek Road at lat/long coordinate: -32.210484, 150.937949	Insufficient road width	Temporary gravel pavement to be placed.
Sandy Creek Road access at 578 Sandy Creek Road	Insufficient road width Interface with property fence Insufficient signage clearance (fingerboard signpost and bidirectional hazard marker)	Temporary gravel pavement to be placed. Temporary property fence removal and reinstatement. Temporary signage removal and reinstatement.

4.3 Further verification and approvals required

The concept-level assessment presented in this report is sufficient to identify a feasible preferred route and the principal local constraints likely to require treatment. However, a number of matters remain to be verified before the route could be confirmed viable for haulage. These matters are expected and are typically addressed during detailed OSOM planning rather than at the EIS stage.

Final vehicle and load confirmation

The final transformer dimensions, transport vehicle configuration, axle groupings, gross mass, trailer platform height and overall load height have not yet been confirmed. These parameters are critical to the final route assessment and may influence clearance checks, structure assessments, temporary works and permit conditions. A detailed route study would therefore need to be based on the final component dimensions and haulage vehicle information.

Overhead and vertical clearance verification

Although desktop screening has been conducted to identify potential overhead constraints, final route suitability would require a detailed clearance survey once the final vehicle envelope is known. This would include bridges, signs, lighting, overhead services, vegetation and any other structures that may affect its movement. Where necessary, the detailed haulage plan would also identify any temporary measures or operational controls required to achieve safe passage.

Bridges and culverts

Detailed structural review of bridges, culverts and other load-sensitive structures may be required to confirm whether any route section, structure crossing or local treatment is affected by axle loading, gross mass or load distribution considerations. The applicant has commenced engagement with Transport for NSW to determine whether a bridge and culvert assessment is required.

Rail interfaces

The preferred route includes a rail level crossing on Sandy Creek Road. The safe and lawful passage of the OSOM vehicle across this interface would require separate review and approval by the relevant rail infrastructure manager (ARTC). Any required operational controls, temporary works, traffic management measures or interface protocols would be determined through this consultation process and cannot be confirmed at this stage.

Temporary works, stopping areas and traffic management

Indicative temporary treatments have been identified in this report to demonstrate concept feasibility at specific local pinch points. The design of those measures, together with any stopping or contingency locations, escort arrangements, travel timing restrictions and broader traffic management controls, would be developed during preparation of the detailed OSOM haulage assessment and traffic management plan required for the movement and undertaken by the haulage contractor.

5. Conclusion

The OSOM route assessment concludes that the transport of the transformers using the design OSOM vehicle from the Port of Newcastle to the project area is feasible and manageable, subject to the implementation of temporary works and standard OSOM management practices. Further validation, assessments are permits are required however prior to haulage commencing.

The key findings of this report are:

- The proposed OSOM route primarily utilise existing major highways, approved OSOM corridors, and planned upgrades associated with EnergyCo's Port to REZ program, where available. As the project OSOM design vehicle is smaller in both length and width than the design vehicle adopted by EnergyCo for the Port to REZ upgrades, no additional route upgrades are required along the majority of the identified route.
- Identified constraints are minor and temporary and confined to the final section of the route within the Muswellbrook Shire local road network.
- Identified pinch points can be resolved through minor, temporary works, including short-sections of hardstand construction, temporary removal and replacement of signage and guardrails, and localised kerb modification or median traversals.
- Height clearances appear adequate based on desktop assessment, with checks and verification to occur subsequently when the load and design vehicle dimensions are confirmed by the haulage contractor and as part of the traffic management and movement permitting process.
- A railway level crossing on Sandy Creek Road requires consultation with Australian Rail Track Corporation to determine any necessary controls and/or treatments required.
- Overall, the proposed OSOM route is considered suitable for transporting the transformer with the adopted design vehicle, and no major constraints have been identified. A detailed OSOM route study, construction traffic and access management plan and NHVR permit process will confirm the detailed works required and secure approvals from road and rail authorities. With the application of these mitigation measures, it is expected that the design OSOM vehicle can safely navigate the full route and access the project area.

6. References

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7. Limitations

This report has been prepared by GHD for Muswellbrook Pro Unit Holdings Pty Ltd and may only be used and relied on by Muswellbrook Pro Unit Holdings Pty Ltd for the purpose agreed between GHD and Muswellbrook Pro Unit Holdings Pty Ltd as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Muswellbrook Pro Unit Holdings Pty Ltd 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 a model for, and for the benefit and sole use of, Muswellbrook Pro Unit Holdings Pty Ltd to support the design and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the Muswellbrook Pro Unit Holdings Pty Ltd, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

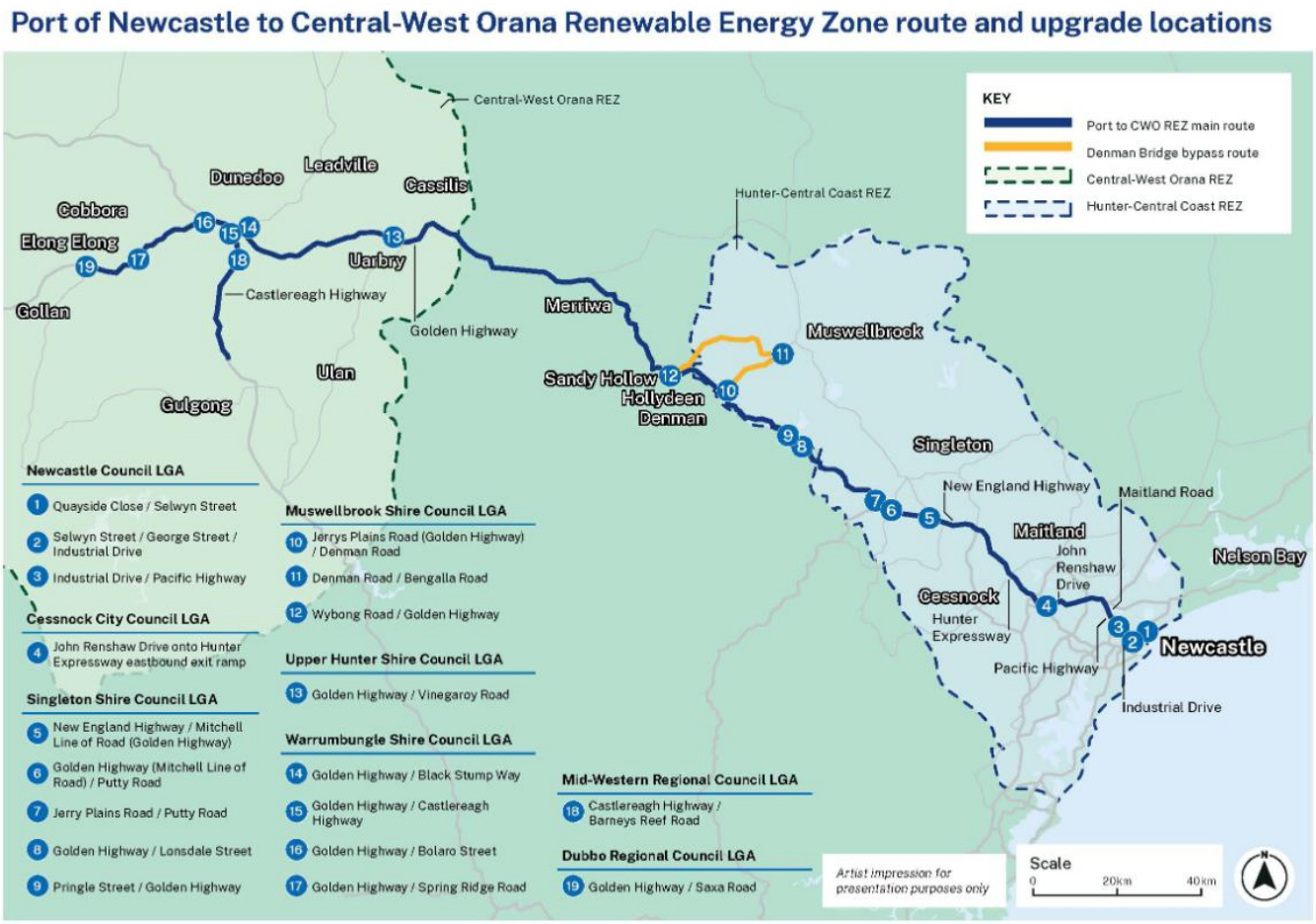
The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

Appendix A

Swept Path Assessment

A-1 Summary of proposed route works from the Port of Newcastle to Denman Road

OSOM vehicles travelling between the Port of Newcastle and Denman Road, Muswellbrook are expected to primarily use approved, or approved-with-conditions, major road and highway OSOM routes. The route from the Port of Newcastle to Denman Road is an NHVR-approved OSOM route and has been identified as part of EnergyCo's 'Port to REZ' road upgrade program to support the movement of OSOM loads from the Port of Newcastle to the REZs, as presented in Figure A.1.



Source: Transport for NSW

Figure A.1 Port of Newcastle to Central-west Orana Renewable Energy Zone route and upgrade locations

A-2 Summary of proposed OSOM route works

A-2-1 ID 10P: New England Highway onto Sandy Creek Road

Background

OSOM vehicle at intersection of New England Highway and Sandy Creek Road is presented in Figure A.2.

It is assumed that the intersection is upgraded by Transport for NSW prior to OSOM vehicle movements, and that the relocation of existing light poles and street signage will be undertaken as part of intersection upgrade works.

The OSOM swept path utilises the proposed pavement widening along New England Highway to minimise traversing onto the grassed verge along the western side of New England Highway. The movement involves minor intrusion (inside corner of movement) on to the proposed kerb.

The identified constraints include:

– insufficient road width
– interface with road barrier (W-Beam and wooden guardrail)
– insufficient signage clearance (Rail Crossing Signal).

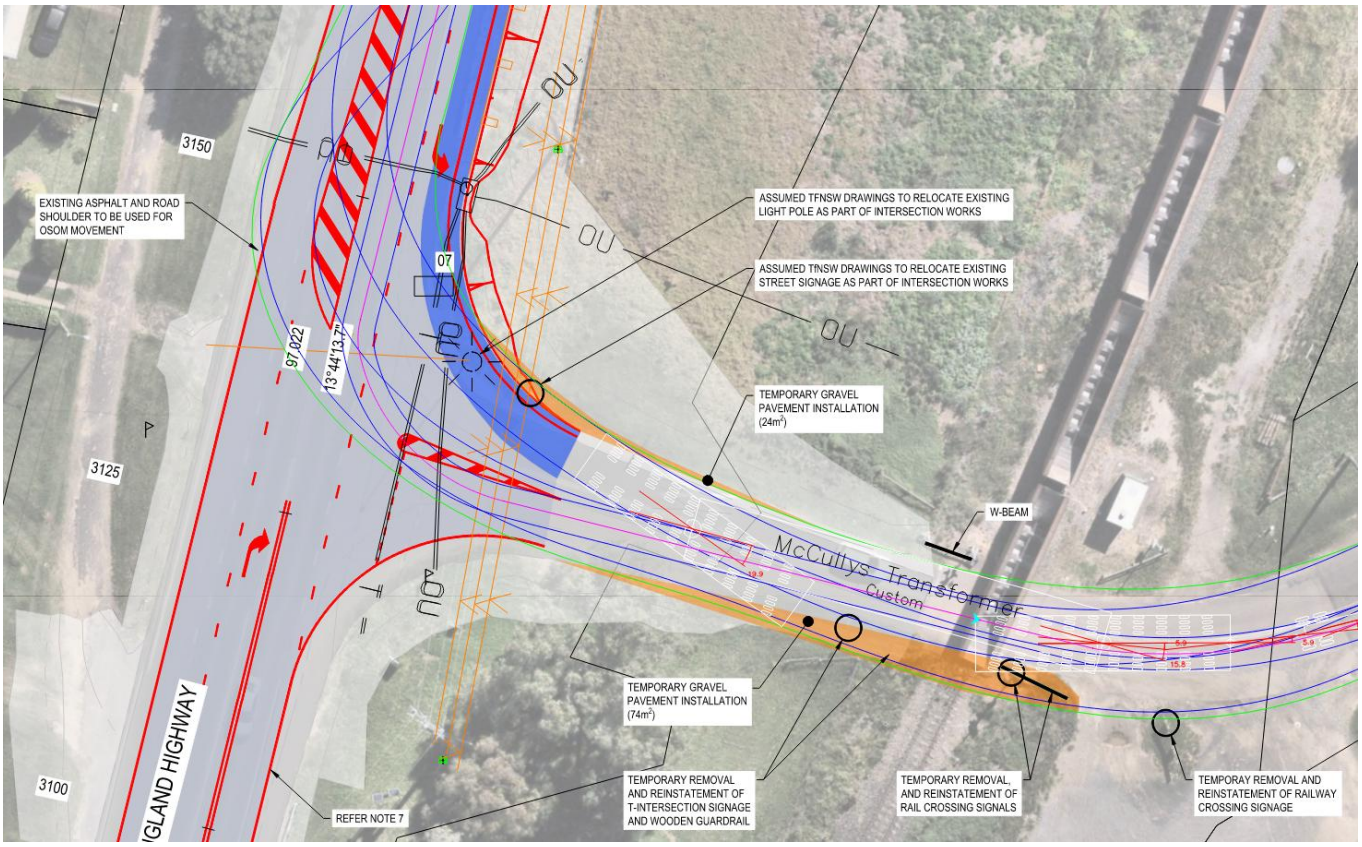






Figure A.2 ID 10P: New England Highway onto Sandy Creek Road

Civil design

To address these constraints the following design measures are proposed:

Temporary widening

Temporary widening is proposed at the intersection to address locations where the pavement road width is insufficient for OSOM vehicle passage during the left-turn movement. Temporary widening will be implemented at identified pinch points to provide a stable trafficable surface and allow the OSOM vehicle to navigate the turn.

Any damage caused to the existing pavement, shoulder and kerb should be assessed, and necessary reinstatements should restore it to its original condition once OSOM travel is completed.

Temporary widening is also required at the rail level crossing. Temporary measures should be provided where encroaching onto rails to allow OSOM vehicle to navigate across the rail level crossing. Rail crossing are high risk/consequence areas and as such coordination with rail authorities (ARTC) would also be required to appropriately manage risks.

Road barrier modification

The existing W-Beam and wooden guardrail located east of rail level crossing requires to be removed during OSOM vehicle movement and reinstated to its original configuration following works.

Signage removal and reinstallation

All existing road signage that falls within the vehicle path will be removed prior to the OSOM transport. These signs will be reinstated following works.

In addition, rail crossing signals require to be temporarily removed and reinstated. Rail crossing are high risk/consequence areas and as such coordination with rail authorities (ARTC) would be required to appropriately manage risks.

A-2-2 ID 11: Sandy Creek Road at -32.219037, 150.937106

Background

OSOM vehicle at Sandy Creek Road at lat/long coordinate -32.219037, 150.937106, is presented in Figure A.3.

The identified constraints include:

– insufficient road width.



Figure A.3 ID 11: Sandy Creek Road at -32.219037, 150.937106

Civil design

To address these constraints the following design measures are proposed:

Temporary widening

Temporary widening has been proposed at the road bend where the existing road is narrow and road width is insufficient for OSOM vehicle passage during the through movement. Temporary widening will be implemented at identified pinch points to provide a stable trafficable surface and allow the OSOM vehicle to navigate the turn.

Any damage caused to the existing pavement, shoulder and kerb should be assessed, and necessary reinstatements should restore it to its original condition once OSOM travel is completed.

A-2-3 ID 12: Sandy Creek Road at -32.216381, 150.936222

Background

OSOM vehicle at Sandy Creek Road at lat/long coordinate -32.216381, 150.936222, is presented in Figure A.4.

The identified constraints include:

– insufficient road width.





Figure A.4 ID 12: Sandy Creek Road at -32.216381, 150.936222

Civil design

To address these constraints the following design measures are proposed:

Temporary widening

Temporary widening has been proposed at the road bend where the existing road is narrow and road width is insufficient for OSOM vehicle passage during the through movement. Temporary widening will be implemented at identified pinch points to provide a stable trafficable surface and allow the OSOM vehicle to navigate the turn.

Any damage caused to the existing pavement, shoulder and kerb should be assessed, and necessary reinstatements should restore it to its original condition once OSOM travel is completed.

A-2-4 ID 13: Sandy Creek Road at -32.210484, 150.937949

Background

OSOM vehicle at Sandy Creek Road at lat/long coordinate -32.210484, 150.937949, is presented in Figure A.5.

The identified constraints include:

– insufficient road width.

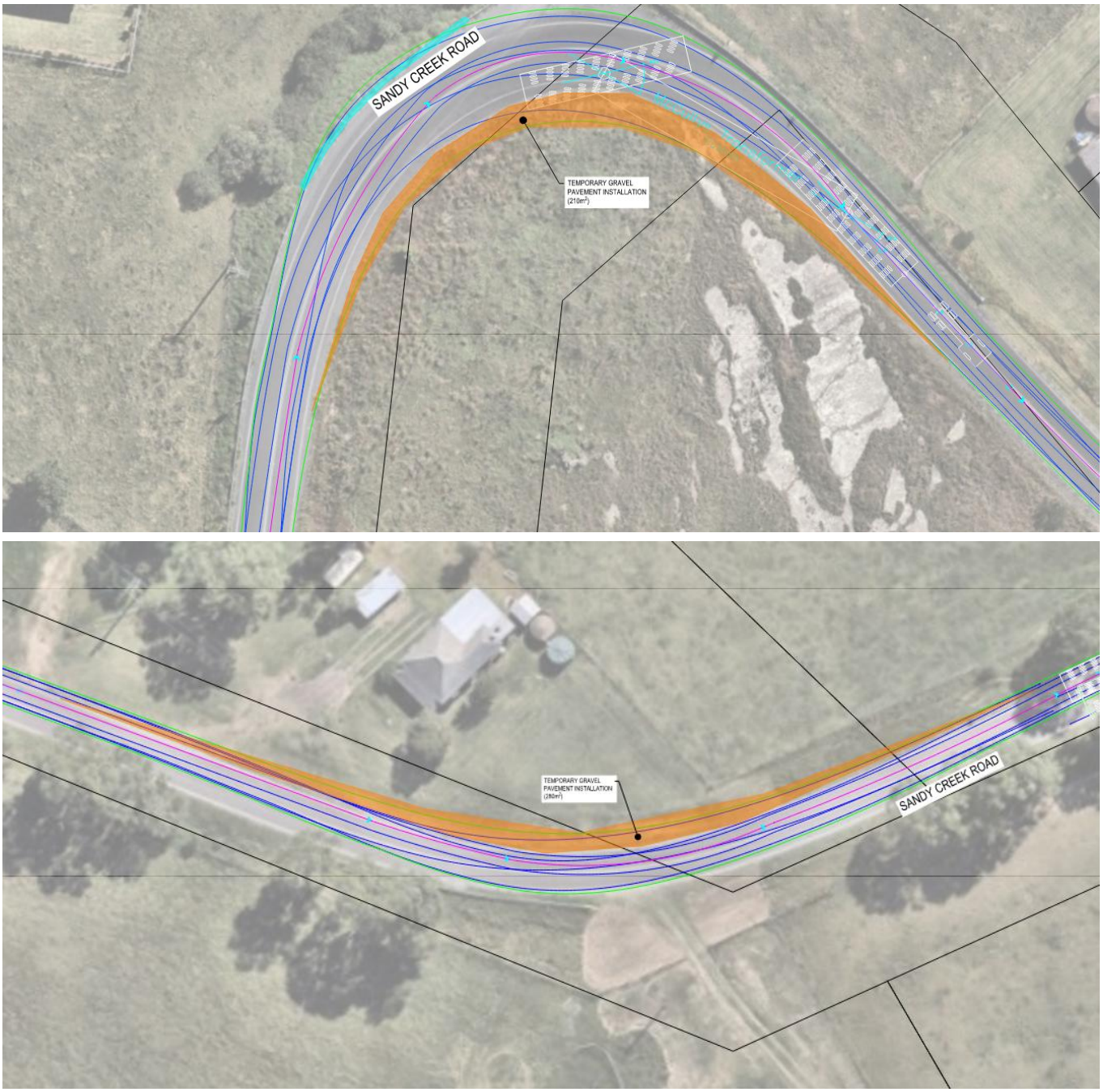




Figure A.5 ID 13: Sandy Creek Road at -32.210484, 150.937949

Civil design

To address these constraints the following design measures are proposed:

Temporary widening

Temporary widening has been proposed at the road bend where the existing road is narrow, and road width is insufficient for OSOM vehicle passage during the through movement. Temporary widening will be implemented at identified pinch points to provide a stable trafficable surface and allow the OSOM vehicle to navigate the turn.

Any damage caused to the existing pavement, shoulder and kerb should be assessed, and necessary reinstatements should restore it to its original condition once OSOM travel is completed.

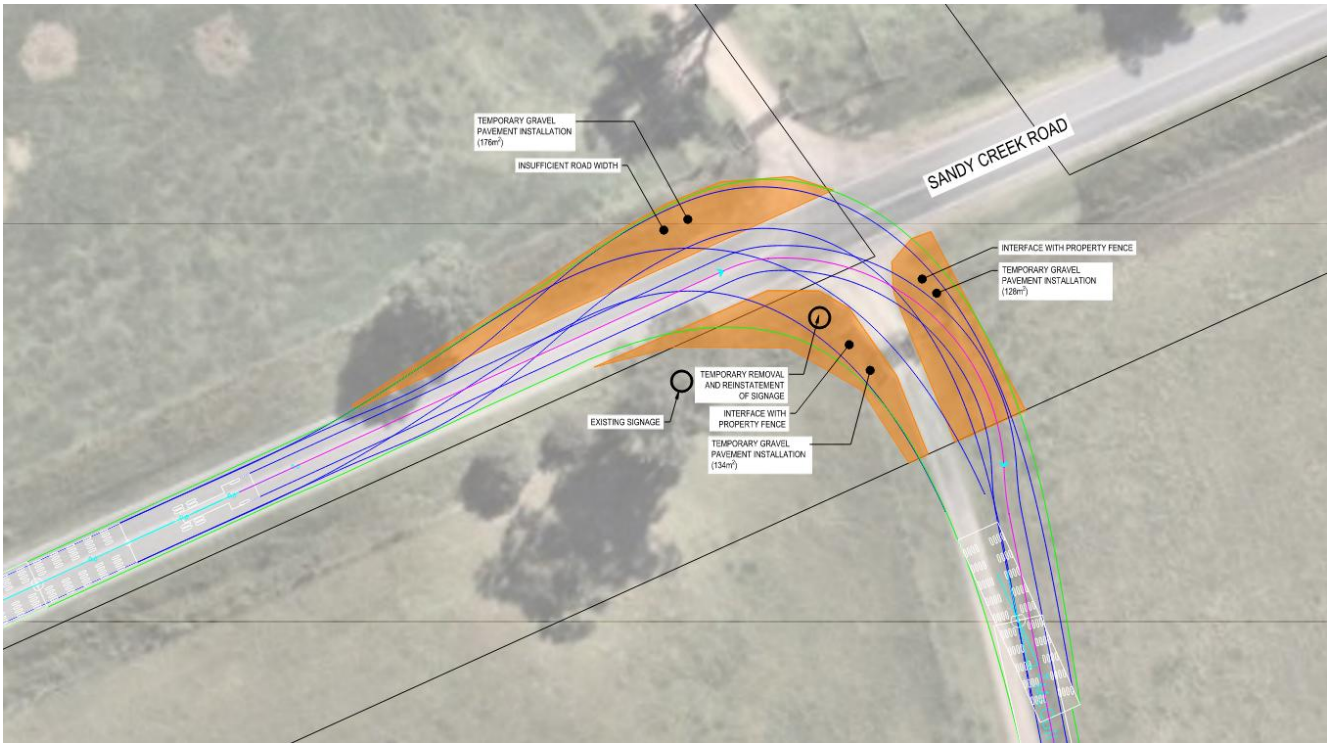
A-2-5 ID 14: Sandy Creek Road onto project area access at property 578, Sandy Creek Road

Background

OSOM vehicle at intersection of Sandy Creek Road and project area access at property 578, Sandy Creek Road is presented in Figure A.6.

The identified constraints include:

– insufficient road width
– interface with property fence
– insufficient signage clearance (fingerboard signpost and bidirectional hazard marker).





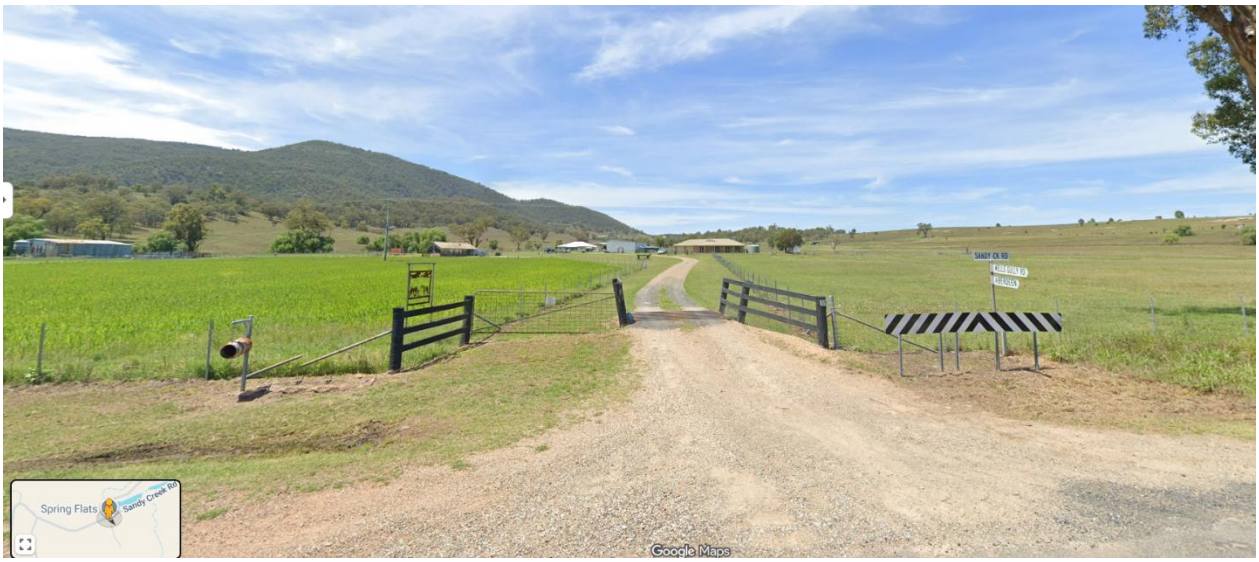


Figure A.6 ID 15: Sandy Creek Road onto property 578, Sandy Creek Road

Civil design

To address these constraints, the following design measures are proposed:

Temporary widening

Temporary widening has been proposed at the Sandy Creek Road/Property no 578 to address locations where the available Sandy Creek Road is insufficient for OSOM vehicle passage during the right-turn movement. Temporary widening will be implemented at identified pinch points to provide a stable trafficable surface and allow the OSOM vehicle to navigate the turn.

Any damage caused to the existing pavement, shoulder and kerb should be assessed, and necessary reinstatements should restore it to its original condition once OSOM travel is completed.

Property fence removal and reinstatement

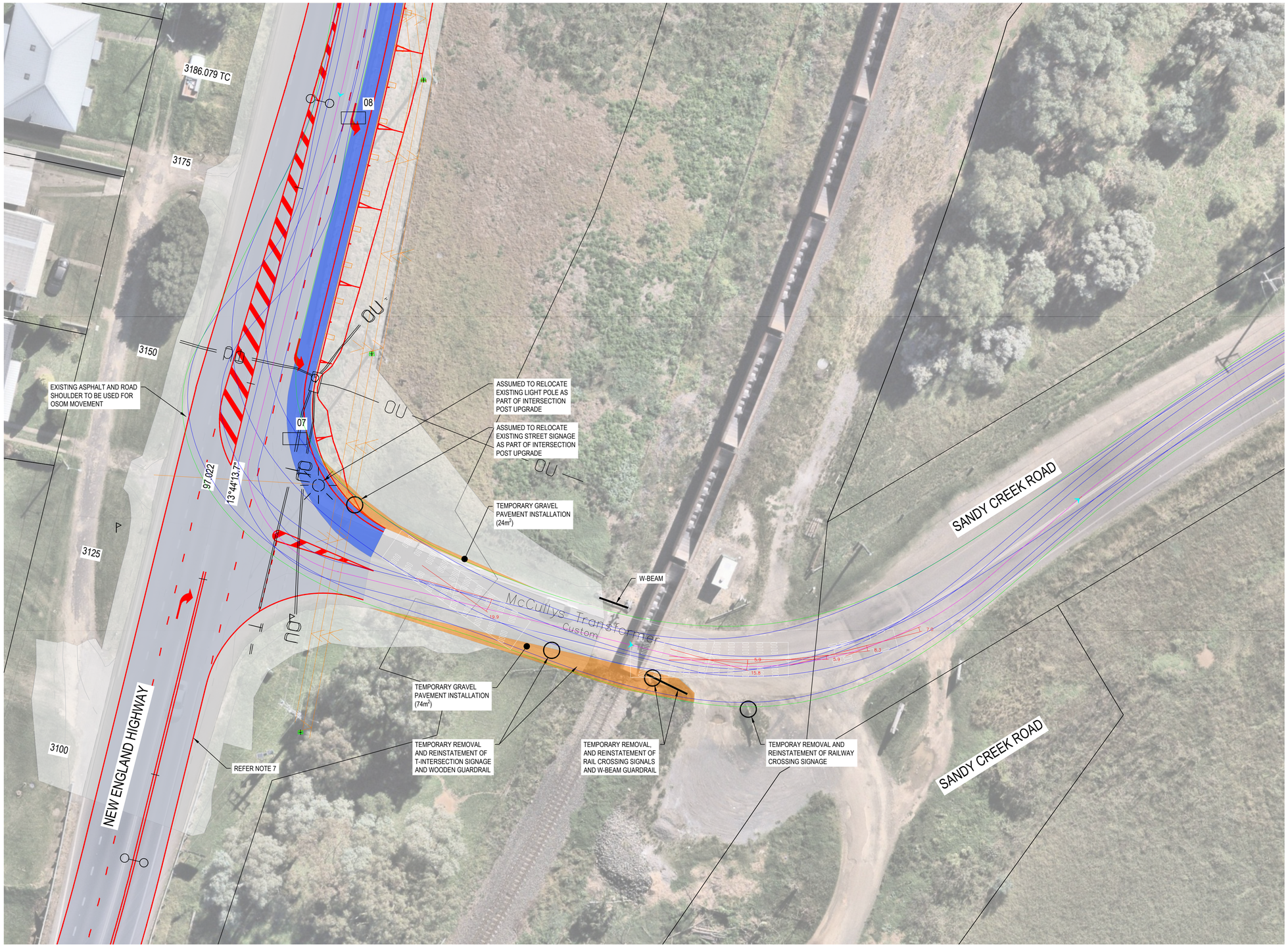
Existing property fence that falls within the vehicle path will be removed prior to the OSOM transport. Upon client's request, reinstating or redesigning of the property fence may be required following the completion of the OSOM transport.

Signage removal and reinstallation

All existing road signage that falls within the vehicle path will be removed prior to the OSOM transport. These signs will be reinstated following the completion of the OSOM transport.

Appendix B

Swept Path Drawings



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.
7. INTERSECTION LAYOUT IS BASED ON INTERSECTION POST UPGRADE.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY GRAVEL PAVEMENT INSTALLATION
- PROPOSED PAVEMENT WIDENING POST INTERSECTION UPGRADE (REFER NOTE 7)
- EXISTING PAVEMENT (REFER NOTE 7)

SWEPT PATH ASSESSMENT

SCALE 1:250

THIS DRAWING INCLUDES COLOURED INFORMATION
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Rev	Description	Checked	Approved	Date
P03	REVISION TO INCORPORATE INTERSECTION POST UPGRADE	JK	MM	13.08.26
P02	CLIENT COMMENTS	JK	MM	15.04.26
P01	PRELIMINARY DESIGN	JK	MM	27.02.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

N

GHD
Level 15, 133 Castlereagh Street,
Sydney NSW 2000 Australia
T 61 2 9239 7100 **F** 61 2 9239 7199
E sydmail@ghd.com **W** www.ghd.com
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Project No. 12627183

Client BW ESS
Project McCULLYS GAP BESS
Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT
PROPOSED ROUTE
ID 10P: NEW ENGLAND HIGHWAY
ONTO SANDY CREEK ROAD

Drawing No. 12627183-GHD-XX-XX-DRG-CI-00067
Size A1
Rev P03

Plot Date: 13 August 2026 - 1:46 PM Plotted by: Wilfred Medel File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00061 TO 00071.dwg



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY REMOVAL AND REPLACEMENT OF ROAD BARRIER
- TEMPORARY MOUNTING OF MEDIAN/KERB ISLAND
- TEMPORARY GRAVEL PAVEMENT INSTALLATION

THIS DRAWING INCLUDES COLOURED INFORMATION
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SWEPT PATH ASSESSMENT

SCALE 1:250

Rev	Description	Checked	Approved	Date
P02	CLIENT COMMENTS	JK	MM	15.04.26
P01	PRELIMINARY DESIGN	JK	MM	27.02.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

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Level 15, 133 Castlereagh Street,
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Project No. 12627183

Client BW ESS

Project McCULLYS GAP BESS

Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT
PROPOSED ROUTE
ID 11: SANDY CREEK ROAD AT
-32.219037, 150.937106

Drawing No. 12627183-GHD-XX-XX-DRG-CI-00068

Size A1

Rev P02

Plot Date: 13 April 2026 - 11:34 AM Plotted by: John Thang File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00061 TO 00071.dwg



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY REMOVAL AND REPLACEMENT OF ROAD BARRIER
- TEMPORARY MOUNTING OF MEDIAN/KERB ISLAND
- TEMPORARY GRAVEL PAVEMENT INSTALLATION

SWEPT PATH ASSESSMENT

SCALE 1:250

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Rev	Description	Checked	Approved	Date
P02	CLIENT COMMENTS	JK	MM	15.04.26
P01	PRELIMINARY DESIGN	JK	MM	27.02.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

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Level 15, 133 Castlereagh Street,
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Project No. 12627183

Client BW ESS

Project McCULLYS GAP BESS

Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT
PROPOSED ROUTE
ID 12: SANDY CREEK ROAD AT
-32.216381, 150.936222

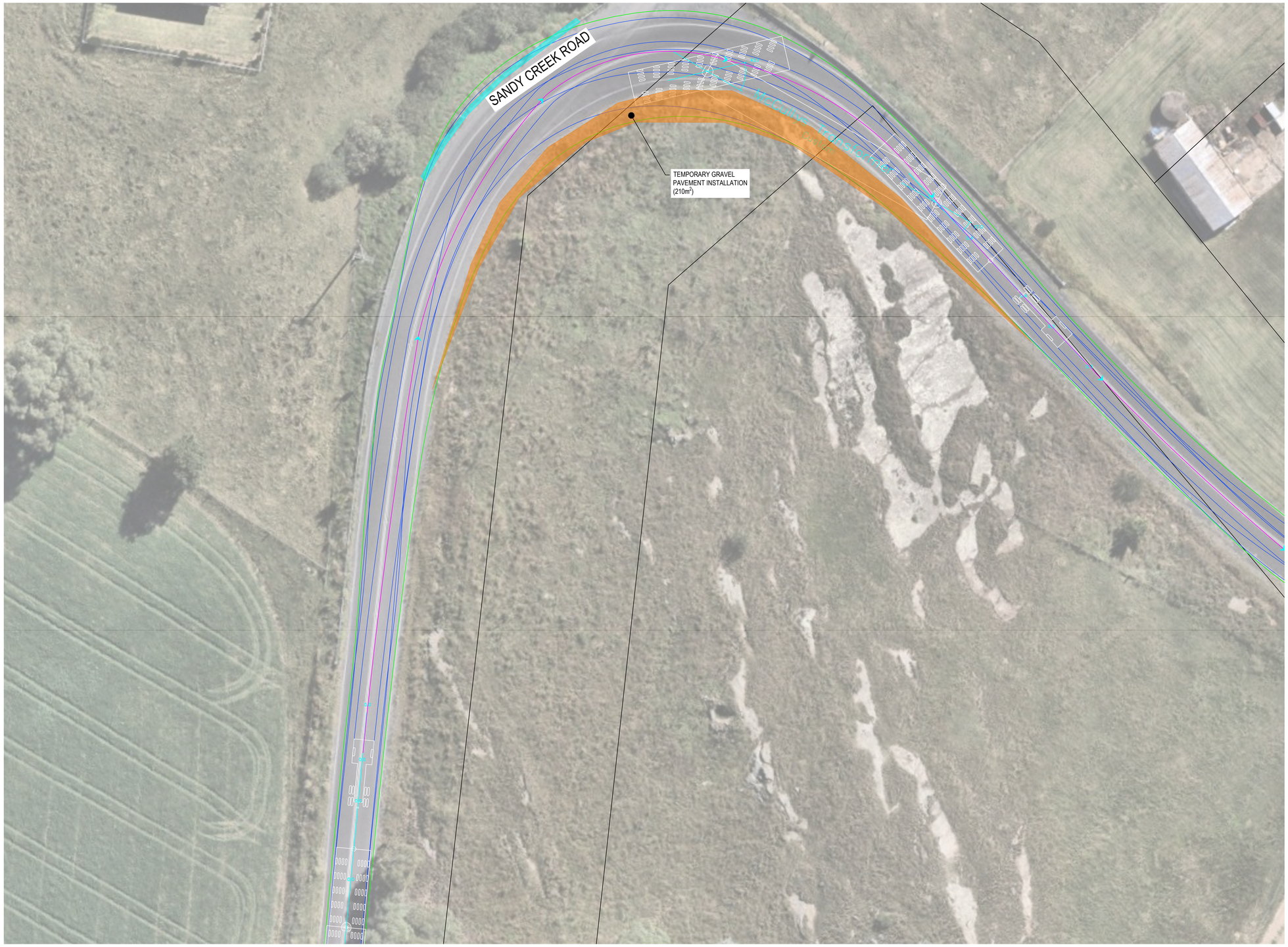
Drawing No. 12627183-GHD-XX-XX-DRG-CI-00069

Size A1

Rev P02

Plot Date: 13 April 2026 - 11:35 AM Plotted by: John Thang

File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00061 TO 00071.dwg



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY REMOVAL AND REPLACEMENT OF ROAD BARRIER
- TEMPORARY MOUNTING OF MEDIAN/KERB ISLAND
- TEMPORARY GRAVEL PAVEMENT INSTALLATION

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SWEPT PATH ASSESSMENT

SCALE 1:250

Rev	Description	Author	Checked	Approved	Date
P02	CLIENT COMMENTS	JK		MM	15.04.26
P01	PRELIMINARY DESIGN	JK		MM	27.02.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

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Project No. 12627183

Client BW ESS

Project McCULLYS GAP BESS

Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT
PROPOSED ROUTE
ID 13: SANDY CREEK ROAD AT
-32.210484, 150.937949 - SHEET 1

Drawing No. 12627183-GHD-XX-XX-DRG-CI-00070

Size A1

Rev P02

Plot Date: 13 April 2026 - 11:36 AM Plotted by: John Thang

File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00061 TO 00071.dwg



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY REMOVAL AND REPLACEMENT OF ROAD BARRIER
- TEMPORARY MOUNTING OF MEDIAN/KERB ISLAND
- TEMPORARY GRAVEL PAVEMENT INSTALLATION

SWEPT PATH ASSESSMENT

SCALE 1:250

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Rev	Description	Checked	Approved	Date
P02	CLIENT COMMENTS	JK	MM	15.04.26
P01	PRELIMINARY DESIGN	JK	MM	27.02.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

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Level 15, 133 Castlereagh Street,
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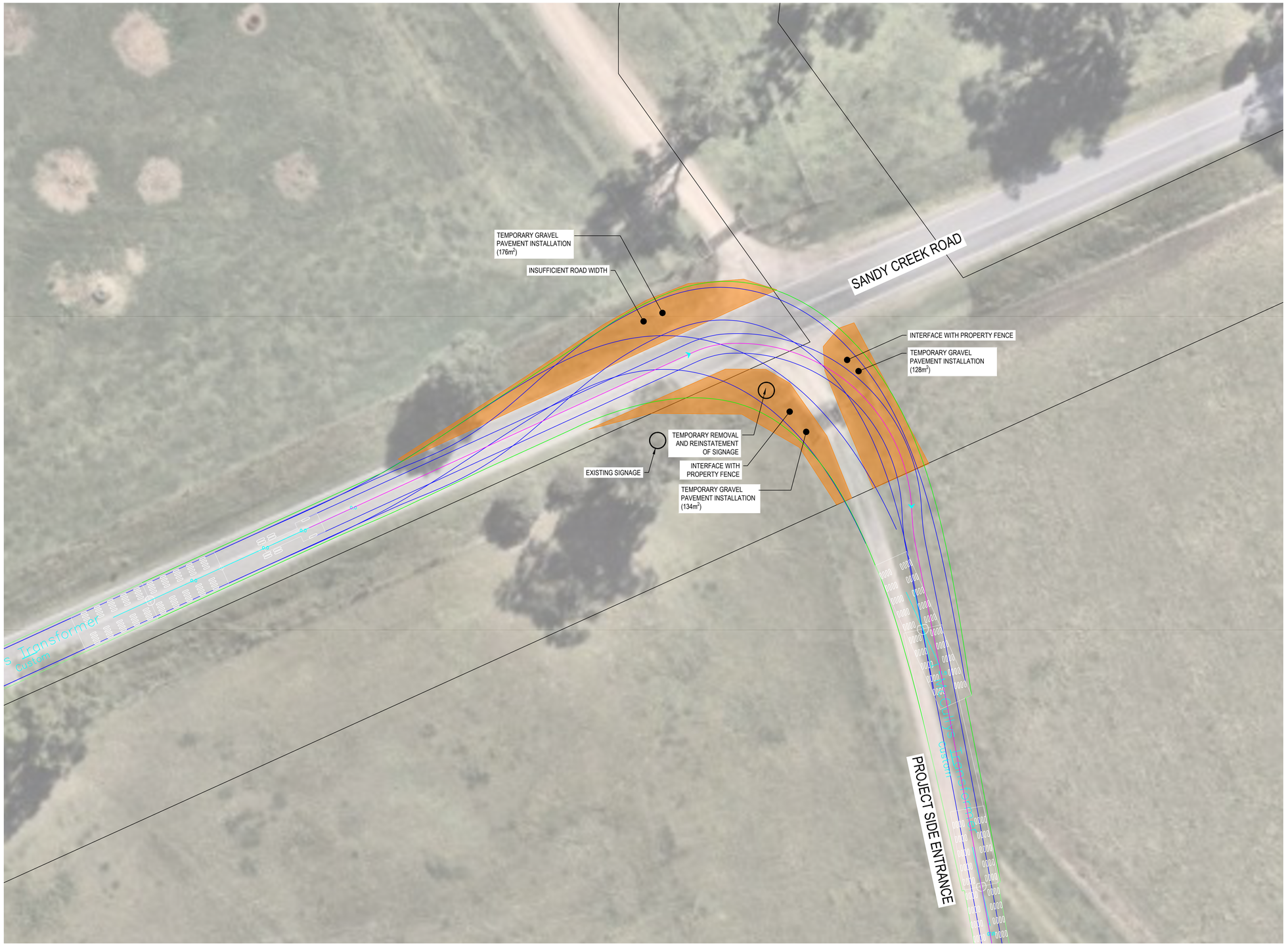
Project No. 12627183

Client BW ESS
Project McCULLYS GAP BESS
Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT
PROPOSED ROUTE
ID 13: SANDY CREEK ROAD AT
-32.210484, 150.937949 - SHEET 2

Size A1
Drawing No. 12627183-GHD-XX-XX-DRG-CI-00071
Rev P02

Plot Date: 13 April 2026 - 11:38 AM Plotted by: John Thang File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00061 TO 00071.dwg



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
2. REFER VEHICLE PROFILE ON '1267183-GHD-XX-XX-DRG-CI-00110' FOR SWEPT PATH VEHICLE.
3. PLAN VIEW SWEPT PATH ASSESSMENT ONLY. NO VERTICAL ASSESSMENT HAS BEEN UNDERTAKEN.
4. LOT BOUNDARIES SOURCED FROM SIXMAPS.
5. AERIAL SOURCED FROM NEARMAPS IN MGA56 GDA20, EXTRACTED 15th DECEMBER 2025.
6. TRAFFIC CONTROL AND ESCORT TO BE PROVIDED DURING OSOM MOVEMENTS.

LEGEND:

- VEHICLE ENVELOPE
- LOT BOUNDARY
- VEHICLE WHEEL PATH
- VEHICLE TRAVEL PATH
- TEMPORARY REMOVAL AND REPLACEMENT OF ROAD BARRIER
- TEMPORARY MOUNTING OF MEDIAN/KERB ISLAND
- TEMPORARY GRAVEL PAVEMENT INSTALLATION

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SWEPT PATH ASSESSMENT

SCALE 1:250

Rev	Description	Checked	Approved	Date
P02	CLIENT COMMENTS	JK	MM	15.04.26
P01	PRELIMINARY DESIGN	JK	MM	24.03.26

Author W. MEDEL **Drafting Check** A. MANALO
Designer H. ALIZADEHMOHAJER **Design Check** J. KEEM

0 2.5 5 7.5 10 12.5m
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GHD
Level 15, 133 Castlereagh Street,
Sydney NSW 2000 Australia
T 61 2 9239 7100 **F** 61 2 9239 7199
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Project No. 12627183

Client BW ESS
Project McCULLYS GAP BESS
Status PRELIMINARY

Drawing Title SWEPT PATH ASSESSMENT PROPOSED AND ALTERNATIVE ROUTES
Size A1
Drawing No. 12627183-GHD-XX-XX-DRG-CI-00079
Rev P02

Plot Date: 13 April 2026 - 11:38 AM Plotted by: John Thang
File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\12627183-GHD-XX-XX-DRG-CI-00072 TO 00077.dwg

Appendix D

Strategic Concept Designs



FIGURE 2

IMAGERY FROM GOOGLE EARTH PRO (c).

PLAN

SCALE 1:250

LEGEND

EXISTING

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.1m)
- CADASTRAL BOUNDARY
- LINEMARKING - BB1
- EDGE LINE - EL1
- LANE LINE - LL1
- STOP LINE
- GUARDRAIL
- EXISTING SIGNAGE
- TREES
- EXISTING EDGE OF PAVEMENT

PROPOSED

- PROPOSED PAVEMENT WIDENING
- LIMIT OF WORKS
- CLEAR ZONE
- DIRECTION TRAFFIC

NOTES:

1. NO DETAILED SURVEY HAS BEEN PROVIDED; AVAILABLE INFORMATION IS BASED SOLELY ON DIAL BEFORE YOU DIG AND ELVIS DATA.
2. NO EXISTING OR PROPOSED MEDIAN IS PROVIDED AT THE INTERSECTIONS.
3. NO LONG SECTIONS ARE PROVIDED, AS NO CHANGES ARE PROPOSED TO THE EXISTING ROAD CENTERLINE.
4. THE DESIGN MAY CHANGE ONCE A DETAILED SURVEY IS PROVIDED.
5. DESIGN OF THE PAVEMENT WIDENING AND PROFILE IS REQUIRED AND SHOULD BE CONSULTED WITH THE PAVEMENT ENGINEER DURING DETAILED DESIGN.
6. DESIGN REQUIREMENTS AND SISD REQUIREMENTS WERE CALCULATED IN ACCORDANCE WITH GUIDE TO ROAD DESIGN PART 3 – GEOMETRIC DESIGN.
7. DRAINAGE IMPACT TO BE ASSESSED DURING DETAILED DESIGN.

PAVEMENT NOTES:

1. PAVEMENT WIDENING TO MATCH EXISTING MATERIAL TYPE AND COURSE THICKNESS AS A MINIMUM.
2. DESIGN TO CONSIDER INTERFACE DRAIN WHERE PAVEMENT PROFILES DIFFER .

FIGURE 1

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Author	Drafting Check	Reg No.		
Designer	Design Check	Date		

0 2.5 5 7.5 10 12.5m

SCALE 1:250 AT ORIGINAL SIZE

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Level 2, 60 Station Street Parramatta NSW 2150
PO Box 788 Parramatta NSW 2124
T 61 2 8898 8800 F 61 2 8898 8810
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Project No.

Client: BW ESS

Project: MCCULLY GAP BESS

Status

Drawing Title: SANDY CREEK ROAD ONTO PROJECT SITE ACCESS SITE LAYOUT PLAN

Size: A1

Drawing No.: 12627183-GHD-00-00-DRG-CI-00201

Rev: A

Plot Date: 17 April 2026 - 5:25 PM Plotted by: Marlon Vinluan

File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\SANDY CREEK\12627183-GHD-00-00-DRG-CI-00201.dwg



McCullys Transformer

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 4.27	Steering Angle	: 40.0
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 4.20		

LEGEND

EXISTING

- 175.0 — EXISTING CONTOUR MAJOR (1.0m)
- 172.6 — EXISTING CONTOUR MINOR (0.1m)
- BDY — CADASTRAL BOUNDARY
- LINEMARKING - BB1
- EDGE LINE - EL1
- LANE LINE - LL1
- STOP LINE
- GUARDRAIL
- EXISTING SIGNAGE
- TREES
- EXISTING EDGE OF PAVEMENT

PROPOSED

- PROPOSED PAVEMENT WIDENING
- LIMIT OF WORKS
- CLEAR ZONE
- PLASTIC BARRIER

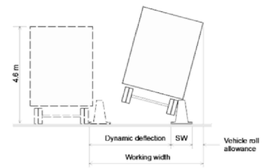
OPERATING SPEED LIMIT:
NEW ENGLAND : 60KmH
SANDY CREEK: 100 Km/H

TURN PATH
DESIGN SPEED : 15Km/H

NOTES:

1. NO DETAILED SURVEY HAS BEEN PROVIDED; AVAILABLE INFORMATION IS BASED SOLELY ON DIAL BEFORE YOU DIG AND ELVIS DATA.
2. TURN PATHS WERE CHECKED BASED ON A 15 KM/H SPEED AND FOLLOW AUSTROADS DESIGN VEHICLES AND TURNING PATH TEMPLATES GUIDE (2023) FOR THE MINIMUM RADIUS USED IN THE DESIGN.
3. WORKING WIDTHS / CLEAR ZONES WERE IDENTIFIED IN ACCORDANCE WITH GUIDE TO ROAD DESIGN PART 6 – ROADSIDE DESIGN, SAFETY AND BARRIERS (2024).
4. PROPOSED AND TEMPORARY SIGNAGE IS TO BE PROVIDED DURING THE DETAILED DESIGN STAGE AND IS TO BE IN ACCORDANCE WITH AS 1742.3 – MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, PART 3: TRAFFIC CONTROL FOR WORKS ON ROADS AND AUSTROADS GUIDE TO TRAFFIC MANAGEMENT.

WORKING WIDTH DETAIL



Legend: SW = System width
Source: ASBAP (2020a) Technical Advice 20-002

McCULLYS TRANSFORMER

PLAN

SCALE 1:500

CLEAR ZONE			
DESIGN SPEED (km/h)	DESIGN ADT	CLEAR ZONE WIDTH (m)	
		FILL BATTER	CUT BATTER
		6:1 TO FLAT	6:1 TO FLAT
≤ 60	< 750	3.0	3.0
100	< 750	5.5	5.0

PERMANENT BARRIERS		TEMPORARY BARRIERS	
BARRIER TYPE	WORKING WIDTH	BARRIER TYPE	WORKING WIDTH
WIRE NOPE BARRIER	1.5 TO 4.0m	PLASTIC (FREE STANDING)	2.0 TO 2.5m
FLEXIBLE W-BEAM	1.2 TO 1.7m	STEEL (FREE STANDING)	2.2 TO 2.5m
STIFF STEEL BARRIERS	0.9 TO 1.4m	STEEL (PINNED)	0.7m
		CONCRETE (FREE STANDING)	1.4 TO 1.8m

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Author	Drafting Check	Reg No.		
Designer	Design Check	Date		

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Project No.

Client BW ESS

Project MCCULLY GAP BESS

Status

Drawing Title SANDY CREEK ROAD ONTO PROJECT SITE ACCESS TURN PATH LAYOUT

Size A1

Drawing No. 12627183-GHD-00-00-DRG-CI-00202

Rev A

Plot Date: 17 April 2026 - 8:42 PM Plotted by: Marlon Vinluan

File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\SANDY CREEK\12627183-GHD-00-00-DRG-CI-00202.dwg

NOTES:

1. SURFACE REFERENCE DERIVED FROM ELVIS MAY NOT ACCURATELY REPRESENT ACTUAL SURVEYED CONDITIONS.
2. NO 3D DESIGN ASSESSMENT WAS UNDERTAKEN FOR THIS SITE, AND THE PROFILE USED FOR SISD MAY NOT REFLECT ACTUAL SITE CONDITIONS. FURTHER INVESTIGATION ON SITE IS REQUIRED.
3. DESIGN REQUIREMENT AND SISD REQUIREMENTS WERE CALCULATED IN ACCORDANCE WI GUIDE TO ROAD DESIGN PART 3 - GEOMETRIC DESIGN, AND GUIDE TO ROAD DESIGN PART 4A UNSIGNALISED AND SIGNALISED INTERSECTION.

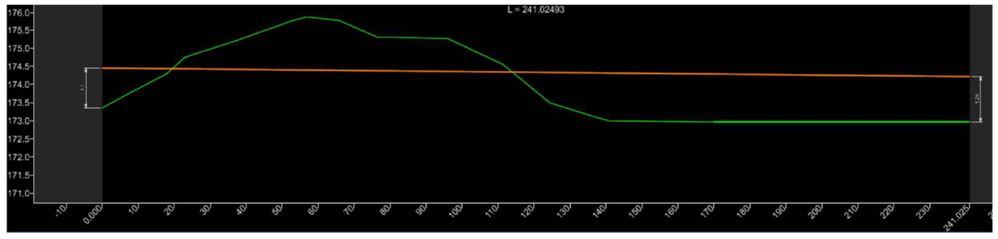
ABBREVIATION / ACRONYM	
ABBREVIATION	MEANING
SISD	SAFE INTERSECTION SIGHT DISTANCE
NB	NORTHBOUND
SB	SOUTHBOUND
EB	EASTBOUND
WB	WESTBOUND
PT1	PRESCRIBED THROUGH LANE 1
CT1	COUNTER THROUGH LANE 1
PR1	PRESCRIBED RIGHT TURN LANE 1
CR1	COUNTER RIGHT TURN LANE 1
RT	REACTION TIME



SIGHTLINE LAYOUT

SCALE 1:1000

SL-1: CT1 RIGHT TURN FROM SANDY CREEK	
DESIGN PARAMETERS	
DESIGN SPEED	100km/h
REACTION TIME	1.5s
EYE HEIGHT	1.10m
TARGET HEIGHT	1..25
COEFFICIENT OF DECLARATION	0.36
SISD (REQUIRED)	234m
GRADE CORRECTION	1.20% (DOWNGRADE)
SISD (CORRECTED)	239m PARTIALLY ACHIEVED, BUT EXISTING TREES MAY CAUSE POTENTIAL VISIBILITY OBSTRUCTIONS.



SIGHTLINE PROFILE

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Designer | Design Check | Date

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Project No.

Client BW ESS

Project MCCULLY GAP BESS

Status

Drawing Title SANDY CREEK ROAD ONTO PROJECT SITE ACCESS SAFE INTERSECTION SIGHT DISTANCE LAYOUT

Size A1

Drawing No. 12627183-GHD-00-00-DRG-CI-00203

Rev A

Plot Date: 17 April 2026 - 5:46 PM Plotted by: Marlon Vinluan

File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\SANDY CREEK\12627183-GHD-00-00-DRG-CI-00203.dwg



PLAN
SCALE 1:500

FIGURE 1

FIGURE 2

LEGEND

EXISTING

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.1m)
- CADASTRAL BOUNDARY
- WATER
- ASBESTOS WATER PIPE
- WATER PIPE FITTING
- COMMS (NBN)
- COMMS (TELSTRA)
- COMMS PIT
- TELSTRA MANHOLE
- ELECTRICAL POLES
- LINEMARKING - BB1
- EDGE LINE - EL1
- LANE LINE - LL1
- STOP LINE
- GUARDRAIL
- EXISTING EDGE OF PAVEMENT

PROPOSED

- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.10m)
- PROPOSED PAVEMENT WIDENING
- LIMIT OF WORKS
- DIRECTION TRAFFIC

NOTES:

1. NO DETAILED SURVEY HAS BEEN PROVIDED; AVAILABLE INFORMATION IS BASED SOLELY ON DIAL BEFORE YOU DIG AND ELVIS DATA.
2. NO EXISTING OR PROPOSED MEDIAN IS PROVIDED AT THE INTERSECTIONS.
3. NO LONG SECTIONS ARE PROVIDED, AS NO CHANGES ARE PROPOSED TO THE EXISTING ROAD CENTERLINE.
4. THE DESIGN MAY CHANGE ONCE A DETAILED SURVEY IS PROVIDED.
5. DESIGN OF THE PAVEMENT WIDENING PROFILE IS REQUIRED AND SHOULD BE CONSULTED WITH THE PAVEMENT ENGINEER DURING DETAILED DESIGN.
6. DESIGN REQUIREMENTS AND SISD REQUIREMENTS WERE CALCULATED IN ACCORDANCE WITH GUIDE TO ROAD DESIGN PART 3 – GEOMETRIC DESIGN.

PAVEMENT NOTES:

1. PAVEMENT WIDENING TO MATCH EXISTING MATERIALS TYPE AND COURSE THICKNESS AS A MINIMUM.
2. DESIGN TO CONSIDER INTERFACE DRAIN WHERE PAVEMENT PROFILES DIFFER.

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Author	Drafting Check		Reg No.	
Designer	Design Check		Date	

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

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Project No.

Client BW ESS

Project MCCULLY GAP BESS

Status

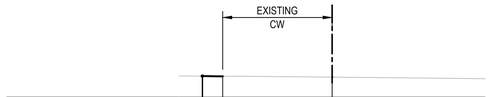
Drawing Title NEW ENGLAND HIGHWAY LEFT TURN TO SANDY CREEK ROAD SITE LAYOUT PLAN

Size A1

Drawing No. 12627183-GHD-00-00-DRG-CI-00301---

Rev A

Plot Date: 11 August 2026 - 2:24 PM Plotted by: Marlon Vinluan File Name: C:\12d\SW\data\P-00-12D-001\21-12627183 - McCullys Gap BESS_4207\CADD\Drawings\SANDY CREEK\12627183-GHD-00-00-DRG-CI-00301---.dwg



DESIGN FEATURES	IA-FILL	ES	CE13	MC01
DESIGN LEVELS	153.378	153.388	153.374	153.312
EXISTING LEVELS	153.378	153.378	153.374	153.312
DESIGN OFFSETS	-8.485	-8.448	-7.146	0.000

A SECTION
CI-00301 SCALE 1 : 200



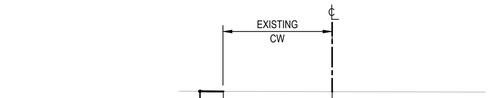
DESIGN FEATURES	MC02	ES1	ES2	IA-FILL
DESIGN LEVELS	153.222	153.286	153.352	153.322
EXISTING LEVELS	153.222	153.286	153.320	153.322
DESIGN OFFSETS	-0.000	4.244	6.558	6.680

D SECTION
CI-00301 SCALE 1 : 200



DESIGN FEATURES	MC02	EEOP5	CE4	IA-FILL
DESIGN LEVELS	152.712	152.758	152.773	152.772
EXISTING LEVELS	152.712	152.758	152.772	152.772
DESIGN OFFSETS	-0.003	5.441	7.142	7.147

G SECTION
CI-00301 SCALE 1 : 200



DESIGN FEATURES	IA-FILL	ES	CE13	MC01
DESIGN LEVELS	153.170	153.181	153.166	153.145
EXISTING LEVELS	153.170	153.170	153.166	153.145
DESIGN OFFSETS	-8.650	-8.607	-7.106	0.000

B SECTION
CI-00301 SCALE 1 : 200



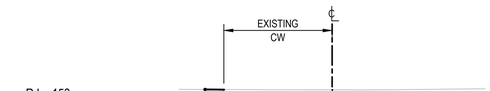
DESIGN FEATURES	MC02	ES1	ES2	IA-FILL
DESIGN LEVELS	152.862	152.908	153.009	152.989
EXISTING LEVELS	152.862	152.908	152.987	152.989
DESIGN OFFSETS	0.000	2.707	6.674	6.756

E SECTION
CI-00301 SCALE 1 : 200



DESIGN FEATURES	MC02	EEOP5	CE4	IA-FILL
DESIGN LEVELS	152.712	152.758	152.773	152.772
EXISTING LEVELS	152.712	152.758	152.772	152.772
DESIGN OFFSETS	-0.003	5.441	7.142	7.147

H SECTION
CI-00301 SCALE 1 : 200



DESIGN FEATURES	IA-FILL	ES	CE13	MC01
DESIGN LEVELS	152.961	152.969	152.957	152.937
EXISTING LEVELS	152.961	152.961	152.957	152.937
DESIGN OFFSETS	-8.308	-8.272	-7.067	0.000

C SECTION
CI-00301 SCALE 1 : 200



DESIGN FEATURES	MC02	ES1	ES2	IA-FILL
DESIGN LEVELS	152.600	152.660	152.758	152.749
EXISTING LEVELS	152.600	152.660	152.749	152.749
DESIGN OFFSETS	-0.000	2.843	6.984	7.019

F SECTION
CI-00301 SCALE 1 : 200

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Author	Drafting Check			
Designer	Design Check			

0 2 4 6 8 10m
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Project No.

Client BW ESS

Project MCCULLY GAP BESS

Status

Drawing Title NEW ENGLAND HIGHWAY LEFT TURN TO SANDY CREEK ROAD CROSS SECTIONS

Drawing No. 12627183-GHD-00-00-DRG-CI-00302

Size A1

Rev A

Plot Date: 11 August 2026 - 1:21 PM Plotted by: Marlon Vinluan

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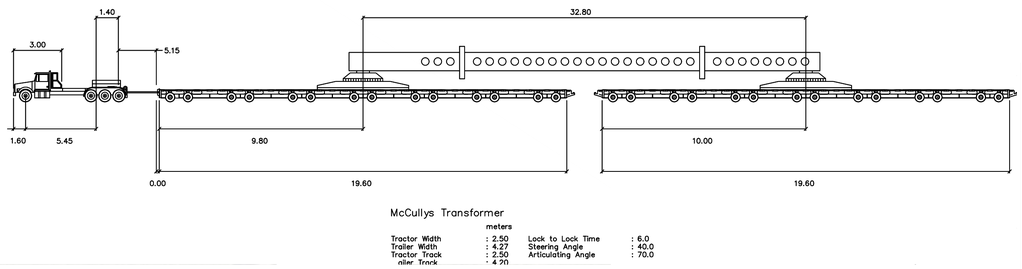




FIGURE 2



FIGURE 1



McCULLYS TRANSFORMER

LEGEND

EXISTING

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.1m)
- CADASTRAL BOUNDARY
- LINEMARKING - BB1
- EDGE LINE - EL1
- LANE LINE - LL1
- STOP LINE
- GUARDRAIL
- EXISTING SIGNAGE
- TREES
- EXISTING EDGE OF PAVEMENT

PROPOSED

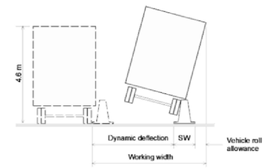
- PROPOSED PAVEMENT WIDENING
- LIMIT OF WORKS
- CLEAR ZONE
- PLASTIC BARRIER
- DIRECTION TRAFFIC

OPERATING SPEED LIMIT:	
NEW ENGLAND :	60Km/H
SANDY CREEK:	100Km/H
TURN PATH DESIGN SPEED :	15Km/H

NOTES:

1. NO DETAILED SURVEY HAS BEEN PROVIDED; AVAILABLE INFORMATION IS BASED SOLELY ON DIAL BEFORE YOU DIG AND ELVIS DATA.
2. TURN PATHS WERE CHECKED BASED ON A 15 KM/H SPEED AND FOLLOW AUSTROADS DESIGN VEHICLES AND TURNING PATH TEMPLATES GUIDE (2023) FOR THE MINIMUM RADIUS USED IN THE DESIGN.
3. WORKING WIDTHS / CLEAR ZONES WERE IDENTIFIED IN ACCORDANCE WITH GUIDE TO ROAD DESIGN PART 6 – ROADSIDE DESIGN, SAFETY AND BARRIERS (2024).
4. PROPOSED AND TEMPORARY SIGNAGE IS TO BE PROVIDED DURING THE DETAILED DESIGN STAGE AND IS TO BE IN ACCORDANCE WITH AS 1742.3 – MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, PART 3: TRAFFIC CONTROL FOR WORKS ON ROADS AND AUSTROADS GUIDE TO TRAFFIC MANAGEMENT.

CLEAR ZONE / WORKING WIDTH DETAIL



Legend: SW = System width
Source: ASBAP (2020a) Technical Advice 20-002

PERMANENT BARRIERS		TEMPORARY BARRIERS	
BARRIER TYPE	WORKING WIDTH	BARRIER TYPE	WORKING WIDTH
WIRE NOPE BARRIER	1.5 TO 4.0m	PLASTIC (FREE STANDING)	2.0 TO 2.5m
FLEXIBLE W-BEAM	1.2 TO 1.7m	STEEL (FREE STANDING)	2.2 TO 2.5m
STIFF STEEL BARRIERS	0.9 TO 1.4m	STEEL (PINNED)	0.7m
		CONCRETE (FREE STANDING)	1.4 TO 1.8m

CLEAR ZONE			
DESIGN SPEED (km/h)	DESIGN ADT	CLEAR ZONE WIDTH (m)	
		FILL BATTER	CUT BATTER
		6:1 TO FLAT	6:1 TO FLAT
≤60	< 750	3.0	3.0
100	< 750	5.5	5.0

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Designer	Design Check	Date	

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

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Project No.

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Project MCCULLY GAP BESS

Status

Drawing Title NEW ENGLAND HIGHWAY LEFT TURN TO SANDY CREEK ROAD TURN PATH LAYOUT

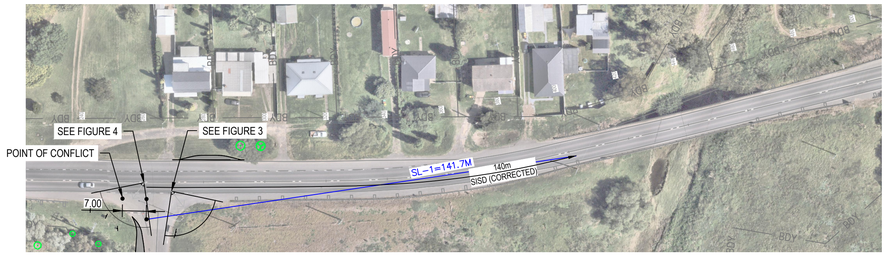
Size A1

Drawing No. 12627183-GHD-00-00-DRG-CI-00303-using 00067 TPath

Rev A

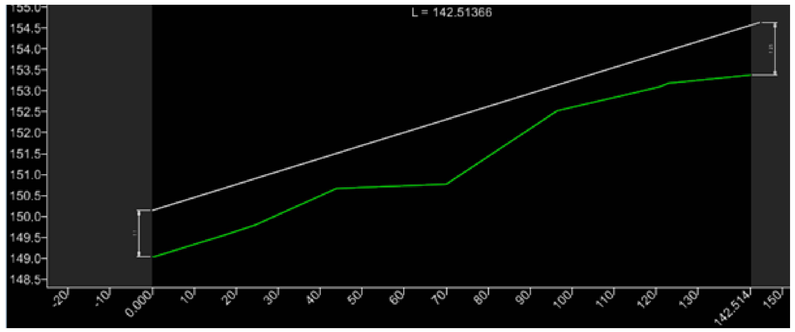
Plot Date: 12 August 2026 - 2:00 PM Plotted by: Marlon Vinluan

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SIGHTLINE LAYOUT 1

SCALE 1:1000

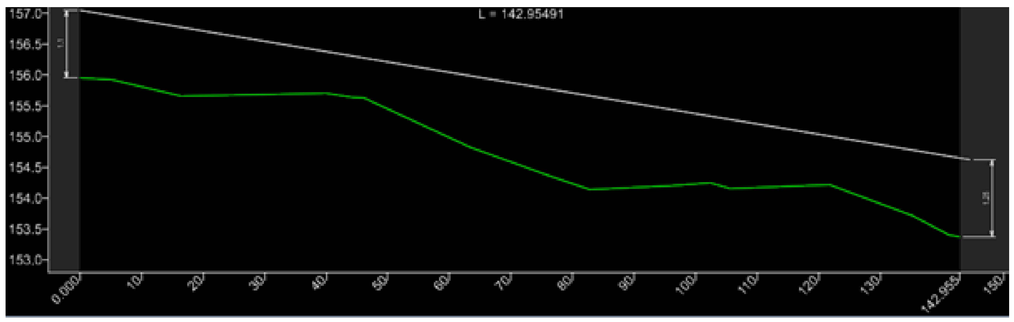


SIGHTLINE PROFILE

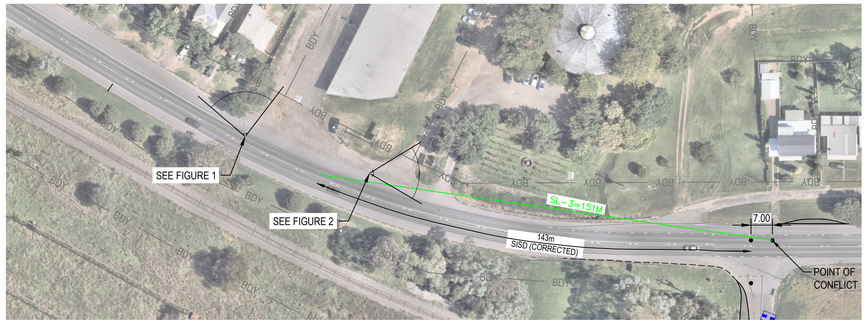


SIGHTLINE LAYOUT 2

SCALE 1:1000

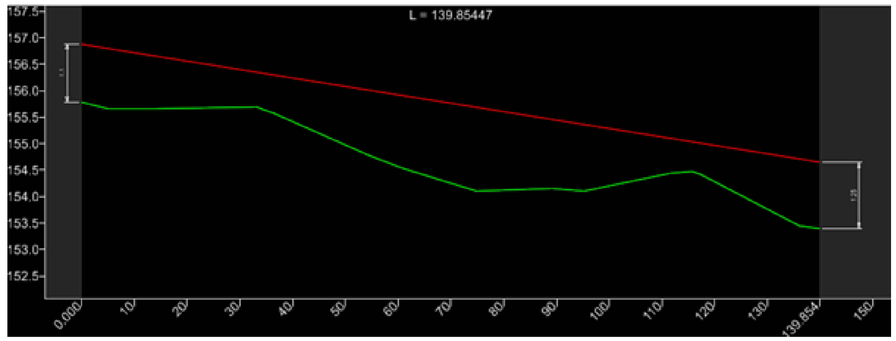


SIGHTLINE PROFILE



SIGHT LINE LAYOUT 3

SCALE 1:1000



SIGHTLINE PROFILE



FIGURE 1 - EXISTING TREE (OBSTRUCTION TO SIGHTLINE)



FIGURE 2 - EXISTING TREES & SIGNAGES (OBSTRUCTION TO SIGHTLINE)



FIGURE 3 - EXISTING POLES & SIGNAGE



FIGURE 4 - EXISTING TREES & SIGNAGE

NOTES:

1. SURFACE REFERENCE DERIVED FROM ELVIS MAY NOT ACCURATELY REPRESENT ACTUAL SURVEYED CONDITIONS.
2. DESIGN REQUIREMENT AND SISD REQUIREMENTS WERE CALCULATED IN ACCORDANCE WI GUIDE TO ROAD DESIGN PART 3 - GEOMETRIC DESIGN AND GUIDE TO ROAD DESIGN PART 4A UNSIGNALISED AND SIGNALISED INTERSECTION.

ABBREVIATION / ACRONYM	
ABBREVIATION	MEANING
SISD	SAFE INTERSECTION SIGHT DISTANCE
NB	NORTHBOUND
SB	SOUTHBOUND
EB	EASTBOUND
WB	WESTBOUND
PT1	PRESCRIBED THROUGH LANE 1
CT1	COUNTER THROUGH LANE 1
PR1	PRESCRIBED RIGHT TURN LANE 1
CR1	COUNTER RIGHT TURN LANE 1
RT	REACTION TIME
SL	SIGHTLINE

SL-1: CT1 NEW ENGLAND HWY – STRAIGHT AHEAD	
DESIGN PARAMETERS	
DESIGN SPEED	70km/h
REACTION TIME	1.5s
EYE HEIGHT	1.10m
TARGET HEIGHT	1..25
COEFFICIENT OF DECLARATION	0.36
SISD (REQUIRED)	141m
GRADE CORRECTION	3.0% (UPGRADE)
SISD (CORRECTED)	140m ACHIEVED, NO VISIBLE OBSTRUCTION

SL-2: LT1 NEW ENGLAND HWY – RIGHT TURN TO SANDY CREEK	
DESIGN PARAMETERS	
DESIGN SPEED	70km/h
REACTION TIME	1.5s
EYE HEIGHT	1.10m
TARGET HEIGHT	1.25
COEFFICIENT OF DECLARATION	0.36
SISD (REQUIRED)	141m
GRADE CORRECTION	1.70% (DOWNGRADE)
SISD (CORRECTED)	143 ACHIEVED, NO VISIBLE OBSTRUCTION.

SL-3: LT1 NEW ENGLAND HWY – STRAIGHT AHEAD	
DESIGN PARAMETERS	
DESIGN SPEED	70km/h
REACTION TIME	1.5s
EYE HEIGHT	1.10m
TARGET HEIGHT	1..25
COEFFICIENT OF DECLARATION	0.36
SISD (REQUIRED)	141m
GRADE CORRECTION	1.70% (DOWNGRADE)
SISD (CORRECTED)	143m ACHIEVED, BUT EXISTING TREES MAY CAUSE POTENTIAL VISIBILITY OBSTRUCTIONS.

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Author	Drafting Check			
Designer	Design Check			

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Client BW ESS

Project MCCULLY GAP BESS

Status

Drawing Title NEW ENGLAND HIGHWAY LEFT TURN TO SANDY CREEK SAFE INTERSECTION SIGHT DISTANCE LAYOUT

Drawing No. 12627183-GHD-00-00-DRG-CI-00304

Size A1

Rev A

Plot Date: 11 August 2026 - 2:02 PM Plotted by: Marlon Vinluan

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