Appendix F

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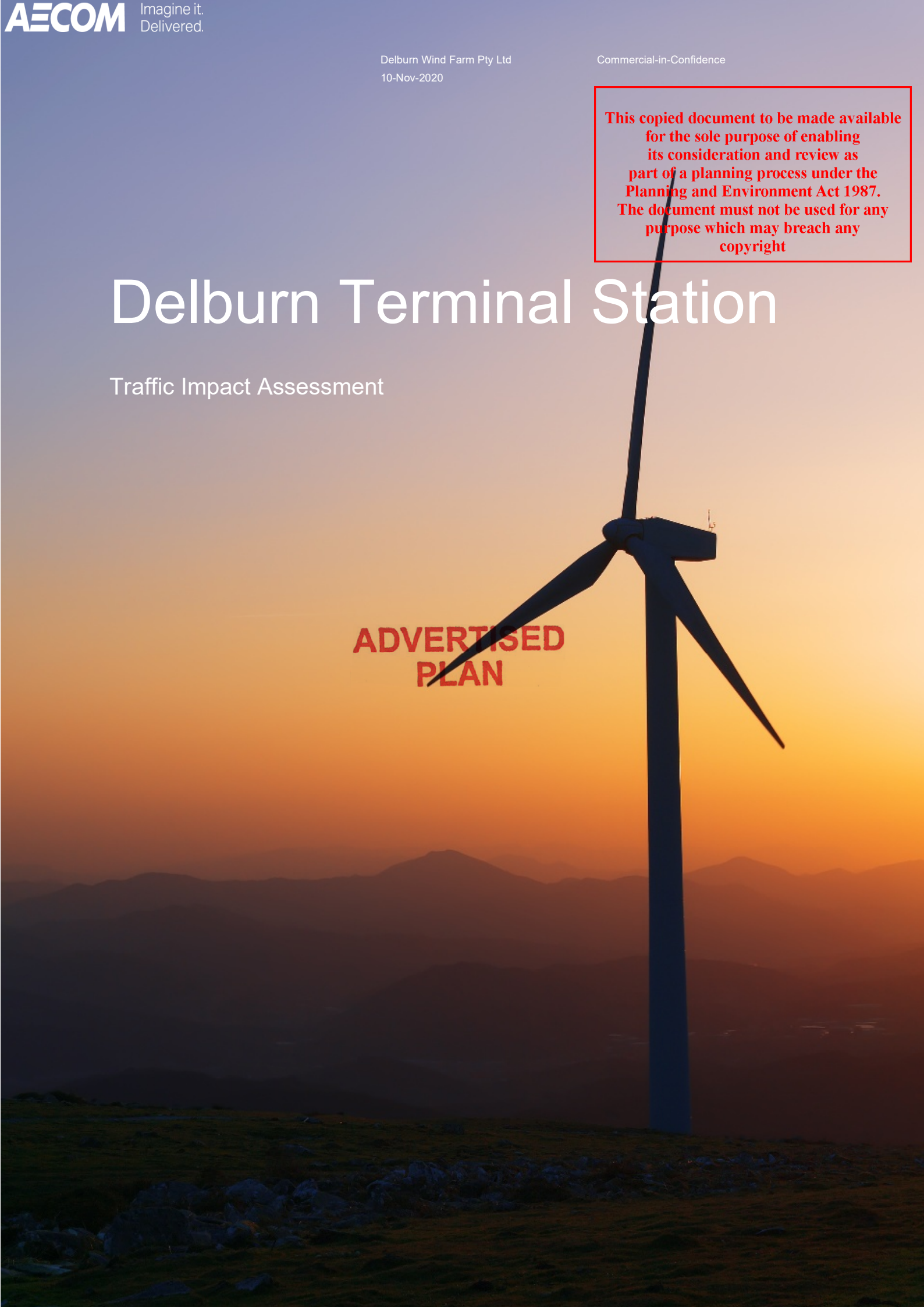
Delburn Terminal Station

Traffic Impact Assessment



Delburn Terminal Station

Traffic Impact Assessment

Client: Delburn Wind Farm Pty Ltd

ABN: 61 614 090 130

Prepared by

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Quality Information

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Prepared by William Chen

Reviewed by Timothy Clune, Matthew Oka

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	04-Nov-2020	Final - For Planning Approval	Trevor March Associate Director - Infrastructure Services	

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Acronym list

AGRD	Australian Guide to Road Design
Articulated Vehicle	AV
ASD	Approach sight distance
AU	Auxiliary lane turn treatment
BA	Basic turn treatment
BESS	Battery energy storage system
CH(L)/(R)	Channelised left/right turn treatments
DoT	Department of Transport
DWFPL	Delburn Wind Farm Pty Ltd
DWEF	Delburn Wind Energy Facility
EVP	Elevated Platform Vehicle
HRV	Heavy Rigid Vehicle
LCC	La Trobe City Council
LCCRMP	Latrobe City Council Road Management Plan
MGSD	Minimum gap sight distance
MRV	Medium Rigid Vehicle
NHVR	National Heavy Vehicle Regulator
OD	Over-dimensional
OD(S)	Over-dimensional (shortened)
ODOM	Over-dimensional over-mass
RRV	Regional Roads Victoria (Part of Department of Transport)
SISD	Safe intersection sight distance
SRV	Small Rigid Vehicle
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
WEF	Wind Energy Facility
WTG	Wind Turbine Generators

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) have been commissioned by Delburn Wind Farm Pty Ltd (DWFPL) to undertake a Traffic Impact Assessment (TIA) as part of the planning application for the proposed Delburn Terminal Station, which facilitates connection of the proposed Delburn Wind Energy Facility (DWEF) to the Victorian transmission network.

1.1 Project background and location

The proposed Delburn Wind Energy Facility aims to be an iconic wind farm overlooking the now closed Hazelwood Power Station. A total of 33 wind turbine generators (WTGs) are proposed.

As part of this development, a 220/33 kV terminal station is proposed which will provide a connection between the wind farm and existing 220kV Hazelwood – Rowville (HWTS – ROTS) dual circuit transmission line.

The indicative development timeframes are outlined below in Table 1-1.

Table 1-1 Indicative development timeline

Year	Activity	Status
2018	Site selection and project feasibility	Completed
2019 – 2020	Community engagement and detail assessment	Completed to phase 1 feedback, phase 2 underway
2020 – 2021	Planning and environmental approvals	Underway
2021 – 2022	Financing and pre-construction	Planned
2022	Construction	Planned
2023	Construction and early operations	Planned

The Delburn Terminal Station development will be located on an existing timber plantation (either HVP Plantations' Thorpdale Tree Farm or VicForests' Blue Gum timber plantation) in the south of the Latrobe Valley, which is approximately 130 kilometres east of Melbourne and within the Latrobe City Shire. The Delburn Terminal Station will be located to the north of Deans Road off Varys Track, approximately 2 kilometres west of the Strzelecki Highway as shown in Figure 1.

Two alternative locations for the terminal station within this area have been identified:

- Location Option A is to the east of Varys Track and located on land adjacent to the Delburn Wind Energy Facility, identified as Crown allotment 52B of A in the parish of Narracan. The site is Licenced to VicForests for Blue Gum plantation timber production.
- Location Option B is to the west of Varys Track and located on land shared with the Delburn Wind Energy Facility. The site is owned by Grand Ridge Plantations (part of the HVP Plantations group) has been recently clear-felled and is being used for pine plantation timber production.

Each terminal station location is effectively identical in terms of scope and nature of the works, including any transport routes and public road upgrade requirements, and consequently there is no material difference in design or traffic assumptions between the two options for the purpose of this TIA. The location of both options can be seen in Figure 1.

Figure 1 Delburn Terminal Station site location

1.2 TIA scope

This TIA has assessed and considered the following scope:

- A review of relevant planning policy and guidelines relevant to the project.
- Review of the existing road network has been undertaken, with information sourced from site visit observations, desktop review and stakeholder inputs.
- Outline of the proposed development according to information provided by Delburn Wind Farm Pty Ltd.
- Construction traffic generation, distribution and traffic impacts on the local road network and site access intersection.
- Identification of construction traffic transport routes from wider ports and on local routes to Delburn Terminal Station. Worst case over-dimensional swept path assessments have been undertaken to identify access mitigation measures and any subsequent native vegetation removal requirements (subject to functional and detailed design stages).
- TIA summary and next steps.

1.3 References

The following reports and / or parties have been referenced or consulted in the preparation of this report:

- Victoria Government Gazette – Road Management Act 2004, Code of Practice, Worksite Safety, Traffic Management 2010.
- Road Management Act 2004.
- Department of Transport (VicRoads) – General Guidance.
- Department of Transport (VicRoads) Heavy Vehicle Network Maps in Victoria.
- Department of Transport (VicRoads) Road Management Plan
- National Heavy Vehicle Regulator (NHVR) website / journey planner.
- Victorian Planning Provisions, planning clause 52.32 – Wind Energy Facility
- Latrobe City Council planning scheme - clause 21.08 Transport and Infrastructure
- Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, Clean Energy Council, June 2018
- Latrobe City Council Road Management Plan.
- Infrastructure Design Manual (2020)
- Austroads Guides to Road Design and associated VicRoads supplements

1.4 Document Status

The estimations detailed herein are considered to reflect the project information currently available, suitable for planning stage works. It is noted that as the project progresses, changes to items such as site layout, terminal station design, delivery vehicles, construction methodology, programme and alike are expected – which will impact items documented within this report.

Where possible, conservative estimates have been adopted throughout the report and as such the findings detailed within are expected to be able to hold should minor changes to the project arise.

It is noted that this TIA will form an input into a subsequent Traffic Management Plan (TMP), which is to be developed to reflect the final detailed Delburn Terminal Station design and construction methodology once verified. Typical requirements for the TMP are outlined in Section 9.2.

2.0 Policy and Guidelines Review

The outlined policies and guidelines documents have been reviewed in the undertaking of this TIA for the Delburn Terminal Station development.

2.1 State policy and guides

The proposed terminal station will be used to transmit and distribute energy generated by the Delburn Wind Farm. A terminal station sits within definition of a 'utility' installation' in the Latrobe Planning Scheme. It is defined as a separate land use to that of the wind farm, notwithstanding the fact that it transmits energy from the wind farm to the electricity grid.

The Minister for Planning is the responsible authority for all new planning permit applications for renewable energy facilities that are 1 megawatt or greater as well as associated utility installations. Accordingly, the Minister for Planning is the responsible authority for the Delburn Terminal Station application.

Key State level policies of the Planning Scheme that are of relevance to transport related matters associated with a terminal station application include the following:

- Clause 18.01-2S (Transport System) seeks to plan or regulate for new land uses to avoid detriment to and where possible enhance the service, safety and amenity desirable for that transport route (amongst a range other strategies).
- Clause 18.02-3S (Road System) which seeks to manage the road system to achieve integration, choice and balance by developing an efficient and safe network and making the most of existing infrastructure.
- Clause 19.01-1S (Energy Supply) seeks to facilitate the appropriate development of energy supply infrastructure. Strategies supporting this include:
  - Support the development of energy facilities in appropriate locations where they can take advantage of existing infrastructure and provide benefits to industry and community.
  - Support the transition to a low carbon economy with renewable energy and greenhouse emissions reductions including geothermal, clean coal processing and carbon capture and storage.
  - Facilitate local energy generation to help diversify the local economy and improve sustainability outcomes.

Key State level policies of the Planning Scheme that are of relevance to the associated Delburn Wind Farm include:

- Clause 19.01-2S (Renewable Energy) references Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (March 2019) and seeks to:
  - Facilitate renewable energy development in appropriate locations;
  - Protect energy infrastructure against competing and incompatible uses.
  - Develop appropriate infrastructure to meet community demand for energy services.
  - Set aside suitable land for future energy infrastructure.

Other relevant wind farm policies and guidelines which have also been considered include:

- Victoria Planning Provisions – Clause 52.32 Wind Energy Facility
- Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines (March 2019)
- Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, Clean Energy Council, June 2018

2.2 Local policy and management plans

2.2.1 Latrobe City Council (LCC)

Planning scheme – Clause 21.08 Transport and Infrastructure

Following key considerations from the Clause 21.08 Transport and Infrastructure have been considered as part of the TIA for Delburn Terminal Station:

- 21.08-1 Objective 1:
  - 1.1 - Provide for an integrated, safe and efficient transport network.
  - 1.2 - Ensure new development provides for safe and efficient access and promotes public transport connections.
- 21.08-1 Objective 2
  - 2.5 – Facilitate a functional, safe and efficient rural roads system that supports the maintenance of the rural character as well as meeting the demands of both rural industry and rural residents.

Planning scheme – Clause 52.06 Car Parking

The purpose the planning scheme is to ensure the appropriate number of car parking spaces are provided for development with regards to the likely demand generated, the activities on the land and the nature of the locality. It should be noted that no specific car parking requirements are outlined for wind energy facilities accordingly this will need to be considered on an operational first principles basis.

Road management plan

The Latrobe City Council Road Management Plan (LCCRMP) sets out the responsibilities of Council and other stakeholders (Regional Roads Victoria, road users) regarding road and path asset management. The LCCRMP aims to inform the community of the ability and expectation of Council to provide and maintain an appropriate level of service that is fit for purpose, accessible, responsive and sustainable.

The LCCRMP identifies a list of arterial roads within Council borders that are the responsibility of Regional Roads Victoria. Particularly relevant are Strzelecki Highway, Princes Highway, Morwell Traralgon Road and Morwell Thorpdale Road. The LCCRMP also states that where roads border neighbouring councils or authorities, Council will have to enter into arrangements and discussions for management of assets. These relevant councils and authorities are South Gippsland Shire, Baw Baw Shire Council and Department of Environment, Water, Land and Planning.

Council is also responsible for the installation and upkeep of public lighting on streets, whereas the maintenance of streetlights that are not working is undertaken by AusNet's preferred service provider.

2.2.2 Department of Transport (VicRoads)

Road management plan

The VicRoads Road Management Plan details the management and maintenance of roads registered under the VicRoads register of public roads. VicRoads manages its infrastructure in five phases; development of standards and guidelines, development of a maintenance program, implementation of the management program, auditing and review. The VicRoads road management plan also details maintenance inspection and response schedules.

3.0 Existing Conditions

3.1 Site and local land use

The proposed Delburn Terminal Station site is located to the north of Deans Road (2 kilometres west of Strzelecki Highway, B460) off Varys Track within the HVP Thorpdale tree plantation (see Figure 2).

The site(s) is bordered by Hernes Oak to the north, Driffield to the south/east, and Narracan to the west. Local land use is dominated by tree plantations or single dwelling properties with associated farmland.

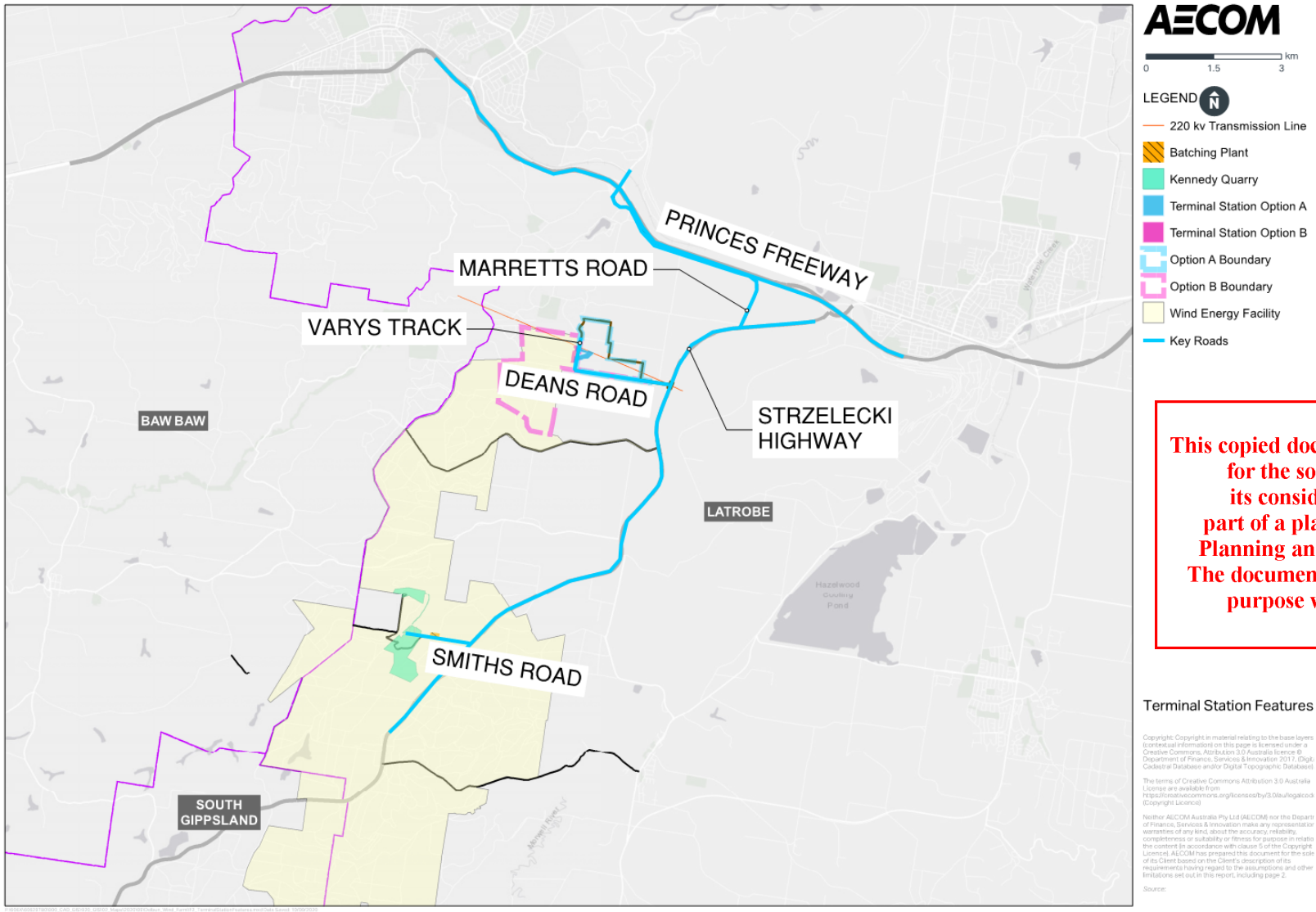


Figure 2 – Key Roads

3.2 Local road network

The following review of the local road network serving the proposed Delburn Terminal Station has been conducted via a combination of site visit observations undertaken by AECOM on Thursday 19 March 2020, desktop review (google street view and aerial measurements of roads) and VicRoads OSOM network information.

The local roads in proximity to the development site are shown in Figure 2.

3.2.1 Department of Transport (VicRoads) road assets

Princes Freeway (M1)

The Princes Freeway (M1) is an M-class highway which links Hastings in the west with Delburn in the east via Narre Warren, Pakenham, Warragul, Yarragon, Trafalgar and Moe. It is generally a two-lane, two-way road. The Princes Freeway (M1) comprises of approximately 3.5 metre wide traffic lanes with 2.5 metre wide sealed shoulders. The posted speed limit of the highway is predominantly 100 km/hr.

The Princes Freeway (M1) is a registered roadway on Victoria's OSOM Network and is a gazetted road for B-Doubles.

Strzelecki Highway (B460)

The Strzelecki Highway (B460) is a B-class highway which interconnects with the Princes Highway (M1) and other local roads via priority intersections, including Deans Road, Golden Gully Road, Smiths Road and Creamery Road. The road is a single carriageway with approximately 3.5 metre wide traffic lanes in each direction, with 2 metre wide sealed shoulders.

The Strzelecki Highway (B460) is a registered roadway on Victoria's OSOM Network and is a gazetted road for B-Doubles.

3.2.2 Latrobe City Council road assets

Marretts Road

Marretts Road (see Figure 3) is a sealed two-way road which provides a link between the Princes Highway (M1) and Strzelecki Highway (B460). The road is a single carriageway with approximately 3.5 metre wide traffic lanes.

It is likely that Marretts Road experiences relatively low traffic volumes, as limited traffic was observed on the road during AECOM's site inspection.

It is noted that no speed signs are present, and drivers must drive to the conditions of the road.

Figure 3 Marretts Road – looking south (Source: AECOM photo taken 19/03/2020)

Deans Road

Deans Road (see Figure 4) is an east-west road that is bound by private farmland and the HVP plantation. Deans Road connects with the Strzelecki Highway (B460) to the east and with Varys Track to the west via priority intersections. The road is predominately unsealed, except for a sealed section of approximately 25 metres where it forms a priority-controlled intersection with the Strzelecki Highway (B460).

Deans Road is approximately 3-3.5-metres-wide, which consequently restricts traffic to one way at a time on the unsealed section of the road. However, there are areas of unvegetated verge where opposing vehicles may slow and pass.

Deans Road is primarily utilised by local agricultural traffic with some traffic from the plantation managers. It is expected that Deans Road experiences low traffic volumes, as no traffic was observed on the road during AECOM's site inspection.

It is noted that no speed signs are present, and drivers must drive to the conditions of the road.

Figure 4 Deans Road, looking west from Strzelecki Highway (Source: DWFPL taken 10/09/2020)

Smiths Road

Smiths Road is an unsealed east-west road which connects with the Strzelecki Highway (B460) to the east and with Ten Mile Creek Road to the west via priority intersections. A short length of Smiths Road near its priority intersection with Strzelecki Highway (B460) is sealed (see Figure 5).

Smiths Road consists of a single carriageway with traffic lanes of approximately 3 metres wide. The road width and vegetation on either side of the road may reduce access for two-way heavy vehicle access.

It is expected that low traffic volumes utilise the road, as no traffic was observed on the road during AECOM's site inspection. It is noted that speed signs are not present, and drivers are encouraged to drive to the conditions of the unsealed road.

Figure 5 Smiths Road – priority intersection with Strzelecki Highway (Source: AECOM photo taken 19/03/2020)

Varys Track

Varys Track (see Figure 6) is a limited access, north-south, road that connects to Deans Road in the south and Marretts Road to the north. The track is unsealed, with an approximate width of 3.0-3.5m similar to Deans Road.

Varys Track is primarily utilised by local agricultural traffic with some traffic from the plantation workers. It is expected that Varys Track experiences low traffic volumes, given the condition and location of the road.

It is noted that no speed signs are present, and drivers must drive to the conditions of the road.

Figure 6 Varys Track, looking north from Deans Road (Source: DWPL 10/09/2020)

3.2.3 Local road network summary

A summary of the considered local road network is provided in Table 3-1.

Table 3-1 Road network summary

Road	Road Authority	Road Category	Posted Speed Limit (km/h)	Approx. Road Width (m)	Road Surface	Comments
Princes Freeway (M1)	DOT (RRV)	Highway	100	7.0	Sealed	Approved route for B-Double and Higher Mass Limit vehicles.
Strzelecki Highway (B460)	DOT (RRV)	Highway	100	7.0	Sealed	Approved route for B-Double and Higher Mass Limit vehicles. Forms part of Over-dimensional Route 9.
Marretts Road	Latrobe City Council	Link	100	7.0	Sealed	Approved route for B-Double and Higher Mass Limit vehicles. Forms part of Over-dimensional Route 9.
Deans Road	Latrobe City Council	Local Access	60*	3.0 – 3.5	Unsealed	
Smiths Road	Latrobe City Council	Local Access	60*	6.0	Unsealed	
Varys Track	Latrobe City Council	Limited access	60^	3.0 – 3.5	Unsealed	

*Noting no observed posted speed limit, but assumed speed limit drivers may drive at given the road conditions

3.3 Existing sustainable modes of transport

3.3.1 Pedestrians and cyclists

Given the rural area there is no dedicated pedestrian or bicycle infrastructure provided near the Delburn Terminal Station site.

3.3.2 Public transport – bus

The DoT have advised that there is a single bus service that operates daily in the project area: The Wonthaggi-Traralgon bus route operates at a frequency of up to seven return bus trips a day (to a total of 25 trips per week) with buses travelling along the Strzelecki Highway (B460), as shown in Figure 7. No bus stops are located within the vicinity of the project site.

No public-school bus routes have been identified in proximity to the proposed Delburn Terminal Station construction site, with the nearest public-school bus services operating along Boolarra Mirboo Road to the south of the site. School bus routes from private schools within the vicinity are not known, however these movements are expected to be limited as there are no dwellings located within the immediate vicinity of the site.

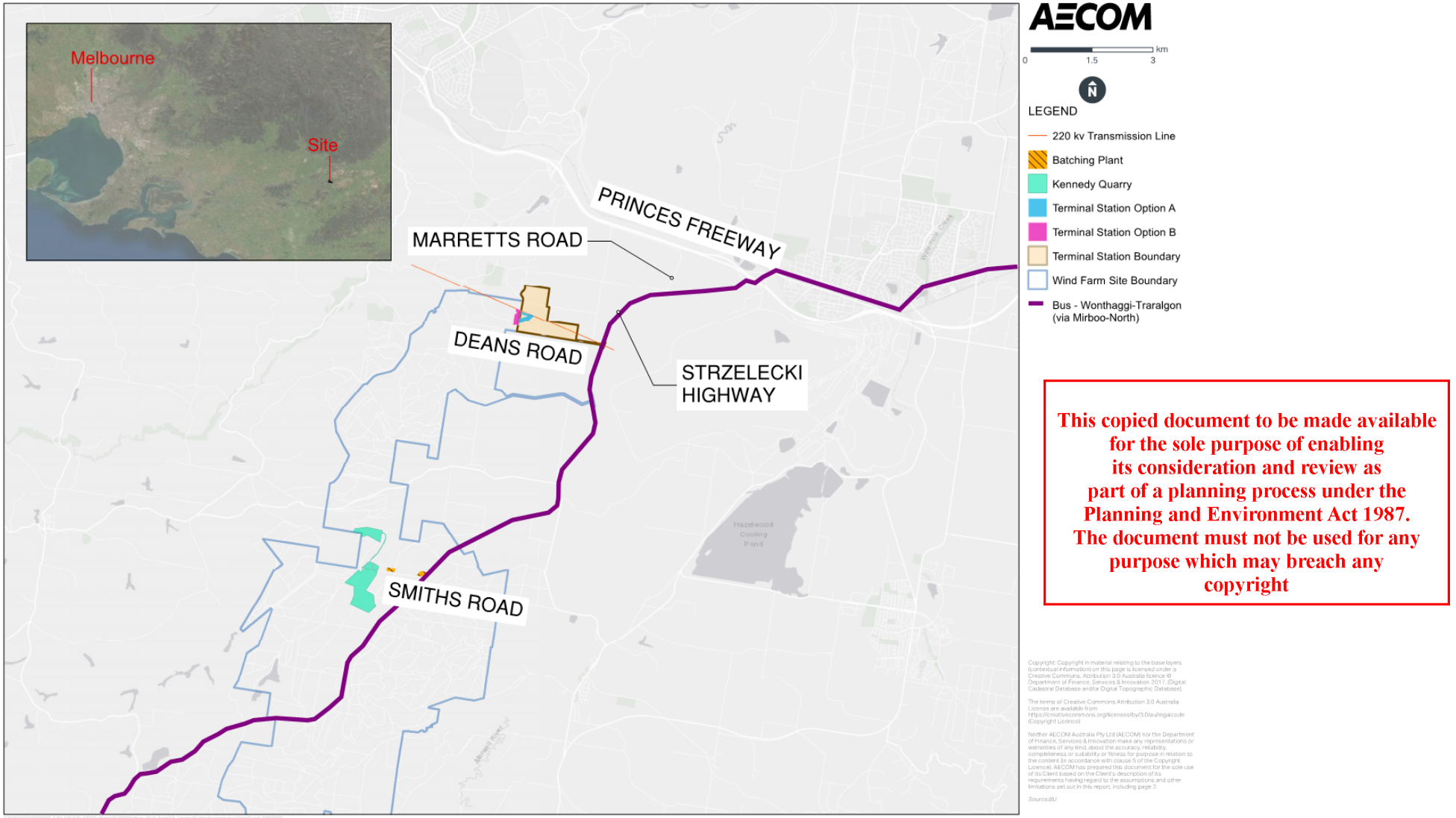


Figure 7 Local bus routes

3.4 Traffic conditions

3.4.1 Traffic volume data

Annual Average Daily Traffic (AADT) volumes for local roads to be utilised by the Delburn Terminal Station have been sourced from DoT and LCC as outlined in Table 3-2.

No AADT traffic volume data for Deans Road and Smiths Road was available from LCC, however they are expected to be lowly trafficked roads (based on road profile and on-site observations).

Table 3-2 Two-way AADT

Road	Two Way AADT Volumes (Year)	2020 Two Way AADT Estimate*	Estimated Two Way Peak Hour Volumes**	% Heavy Vehicles
Strzelecki Highway Btw Princes Highway and Morwell Thorpdale	4,800^ (2020)	4800	480	9%
Marretts Road	876^ (2015)	930	93	NA

Notes: ** *Compounding 1.5% yearly growth rate assumed beginning from the next year, rounded to nearest whole vehicle.*

* *Assumed to be equal to 10% of AADT, rounded up to next whole vehicle.*

3.4.2 Crash history analysis

The latest available VicRoads CrashStats was reviewed (for crashes between 2013 and 2019) for relevant roads within a 2-kilometre distance of the Delburn Terminal Station site access. The summary analysis outputs are provided in Appendix A.

A total of 81 recorded crashes were found to occur over the analysed time period with no key trends in reoccurring crash types at the key access intersections to the wind farm or terminal station. The relevant crash findings specific to terminal station access include:

- No recorded crashes along Deans Road.
- A single crash was found to occur at the Strzelecki Highway (B460) and Smiths Road priority intersection. It was classified as a 'non-overtaking related head on collision' and was classified in terms of severity as an 'other injury', recorded on 29th of November 2013.

  It is noted that the Strzelecki Highway (B460) and Smiths Road priority intersection was upgraded in 2015 to provide a dedicated right-turn treatment from the Strzelecki Highway (B460), which is expected to improve the safety of the intersection.

4.0 Proposed Delburn Terminal Station Project

4.1 Overview

The proposed Delburn Wind Energy Facility aims to be an iconic wind farm overlooking the now closed Hazelwood Power Station. As part of this development, a 220/33 kV terminal station has been proposed to provide a connection between the wind farm and the existing 220kV Hazelwood – Rowville (HWTS – ROTS) dual circuit transmission line.

At this stage of design, there are two locations being considered for the Delburn Terminal Station (layouts provided in Appendix B), with both having the same internal configuration and accessed from the Varys Track via Deans Road:

- Location option A – East of Varys Track
- Location option B – West of Varys Track

The footprints for both terminal station options are shown in Figure 8.

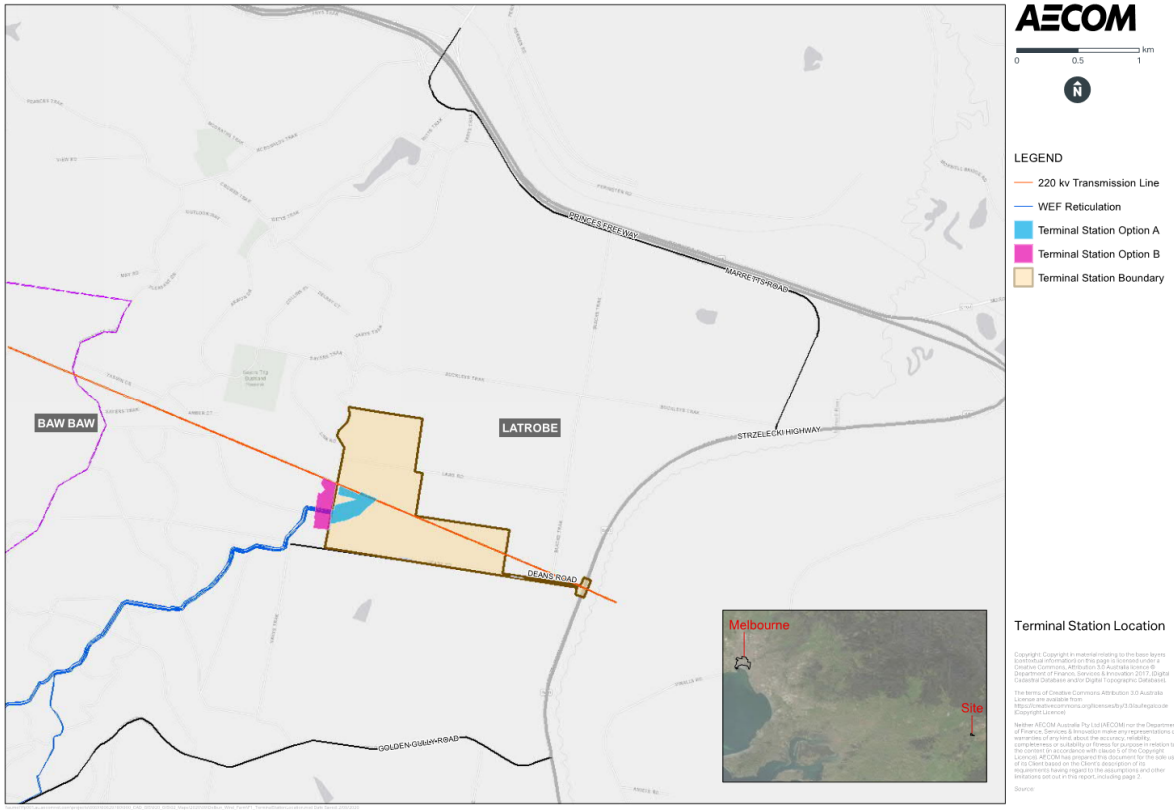


Figure 8 – Terminal Station Options

The Delburn Terminal Station may be designed as a single circuit or dual circuit tie in arrangement, and the transformation is proposed to be undertaken using a single 240 MVA 220/33 kV transformer.

A temporary construction compound of approximately 1 hectare in size would be provided adjacent to the adopted terminal station location to facilitate the construction of the works. The compound would include temporary offices, amenities, laydown areas, storage, and parking.

Works associated with the adjacent battery energy storage system (BESS) facility and the wind energy facility reticulation have been addressed as part of the Delburn Wind Farm Traffic Impact Assessment report, AECOM, Revision 3, July 2020.

Terminal station developments typically consist of three stages: construction, operation and either re-powering or de-commissioning. The following subsections outline the durations and typical activities during each of these stages for the terminal station.

4.2 Stage 1 - construction

4.2.1 Timing and activities

It is estimated that the construction period, including preparatory works and site rehabilitation will take approximately 12 months from site preparation to completion. The typical construction tasks of the terminal station are outlined below:

- Access roads and intersection upgrades
- Temporary construction compound
- Foundation
- Terminal station construction
- Line tie-in
- Commissioning and rehabilitation.

4.2.2 Construction operations and material sources

At this stage of the project, the following is known with regards to the construction of Delburn Terminal Station:

- Equipment and workers will be transported to the project site in order to establish the site. Temporary site offices to be located adjacent to the Varys Track accessed via Deans Road with associated car parking for private vehicles. If site restrictions exist, then carpooling or mini-bus transfer may need to be considered.
- It has been assumed that the terminal station will utilise the Kennedy Haulage Driffield Quarry on Smiths Road to satisfy aggregate demands of the project, with concrete to be batched from two temporary plants also located on Smiths Road before being transported to the terminal station..
- Material sources have yet to be verified and are subject to discussions with suppliers and Port(s) for delivery logistics. However, regardless of delivery ports, it is expected that most materials will be delivered via the Princes Freeway, to the north of the site approaching from the west. The OD delivery associated with the terminal station transformer is expected to originate from a one of the four ports, as discussed subsequently in Section 7.1, or from a site in Glen Waverley.

4.3 Stage 2 – operational

Following commission, the Delburn Terminal Station is expected to operate for approximately 20-25 years. It is expected that up to two staff vehicles will commute per day to and from the site to undertake general maintenance activities. Generally, maintenance type vehicles with be a mixture of light and medium sized vehicles.

There could be exceptions to general maintenance in the event of components requiring replacement which could include the substation transformer or transmission line maintenance.

In the above events larger vehicles may require access to the site, including OD vehicles. OD deliveries will be coordinated with necessary approvals from NHVR in association with key stakeholders.

4.4 Stage 3 – re-powering or de-commissioning

At the end of the Delburn Terminal Station lifecycle there are options to either re-power or de-commission the site as outlined below:

- Re-powering the terminal station would involve removing the existing terminal station components above ground level and upgrading with newer technology and associated infrastructure.

- De-commissioning involves dismantling the terminal station whilst leaving sub-surface cables and foundations in-situ.
- In both cases materials and associated machinery would be removed from the site, with material recycled where possible.
- Both will involve similar vehicles to the construction stage, although vehicle frequency will be reduced as no concrete batching plant or materials deliveries are required.

5.0 Delburn Terminal Station Vehicle Access

5.1 Stage 1 – construction stage access

5.1.1 Construction access points

The construction site access points are shown in Figure 9 and outlined below:

- Access point 01 via Deans Road:
  - Sole access point for terminal station construction activities.
  - Access point 01 is located approximately 2 kilometres west on Deans Road of the Strzelecki Highway (B460) and Deans Road priority intersection.
  - The access primarily uses the existing access track network; however, upgrades of the access tracks are expected to be required to enable access by construction traffic.
- Access point 02 via Smiths Road
  - Smiths Road forms a priority intersection with the Strzelecki Highway (B460) and will be used to access the project quarry and batch plant, which will be shared with the construction of the DWEF.
  - The batching plant accesses are located approximately 700 metres west of the access point 02.
  - The Driffield quarry can be found approximately 800 metres west of access point 02.

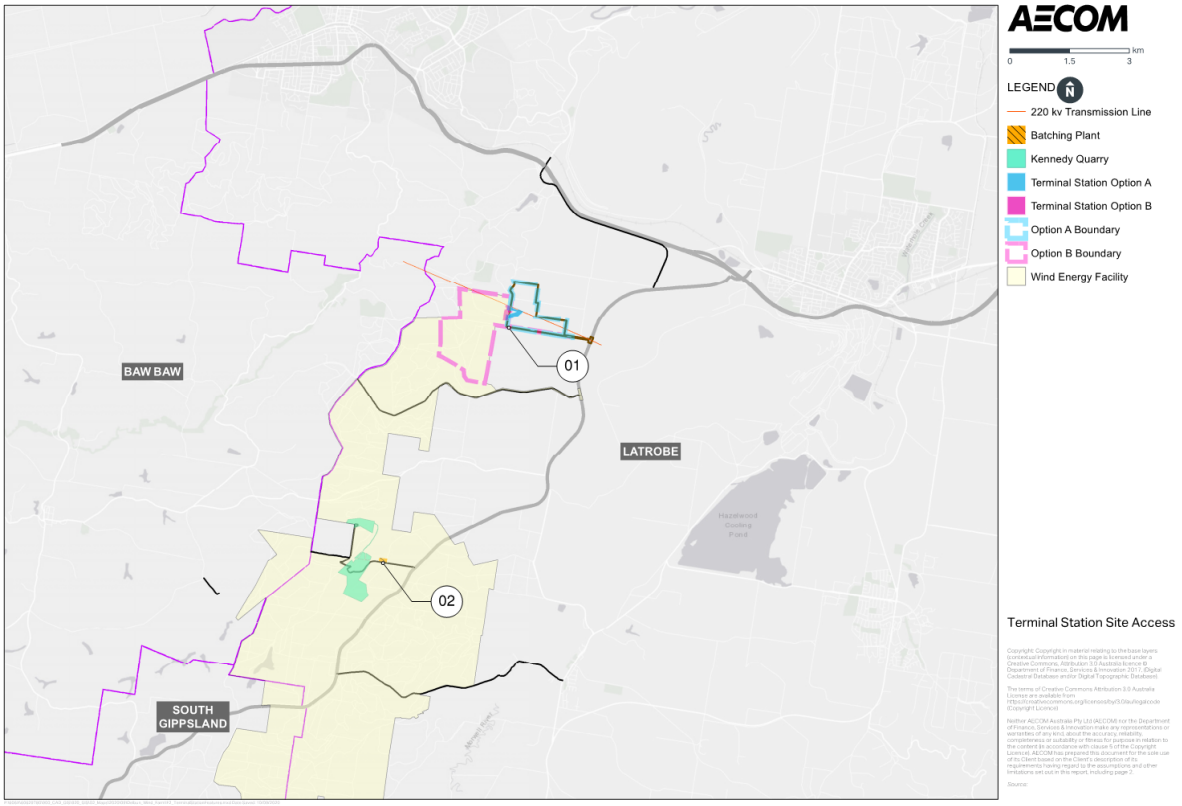


Figure 9 Delburn Terminal Station local delivery route and site access points

5.1.2 Construction access routes

Externally sourced materials / components and workers

It is noted that the primary delivery port for terminal station components and materials has not yet been confirmed, however regardless of delivery port, externally sourced materials including OD components are expected to be delivered to the site from the north via the Princes Freeway (M1), Marretts Road and Strzelecki Highway (B460), before turning off at the access priority intersections of Deans Road (access point 01) and Smiths Road (access point 02).

High level OD and construction vehicle route analysis from potential Ports is discussed in Section 7.0.

Workers are expected to access the site from all directions and reside within the surrounding towns of Morwell, Moe, Traralgon, Churchill, Mirboo North and Leongatha.

Internally sourced materials

At this planning stage it has been assumed, based on advice from DWFPL, that the construction of the Delburn Wind Energy Facility will utilise the Kennedy Haulage Driffield Quarry (located via Smiths Road, access point 02) to satisfy aggregate demands of the project.

There are also two temporary concrete batching plants located on Smiths Road.

5.1.3 Construction vehicles

The construction vehicle types have been consolidated into groupings for the purposes of aiding with vehicle route assessments by their anticipated size, as can be seen in Table 5-1.

Table 5-1 Construction traffic classification consolidation

Over-arching Vehicle Type	Sub-Vehicle Type	Vehicle Classification	Vehicle Length (based upon classification in metres, m)	Transport Vehicles Gross Vehicle Mass (tonnes, t)
Light Vehicles	Private Car	99th percentile passenger vehicle	5.2	-
	Utes			-
Truck	General Purpose Vehicle	Small Rigid Vehicle (SRV) 2-5 Tonne	6.4	-
	EPV (Elevated Platform Vehicle)	Medium Rigid Vehicle (MRV) 10 Tonne	8.8	-
	Rubbish Truck			-
	Concrete Truck	Heavy Rigid Vehicle (HRV)	12.5	22.4
	Rigid Truck			13.5
	Small Crane			TBC
	Semi-trailers	Articulated Vehicle (AV)	25.0	16.5
	Truck and Dog			30.5
	Low Loader			TBC
	Over-dimensional	Over-Dimensional – Main transformer	TBC (approx. 39m)	TBC approx. (163-205)

**OD vehicle dimensions and weights will be subject to final specifications. OD vehicles will typically have trailer widths ranging from 4.0 metres to 5.0 metres and heights ranging from 4.9 metres to 5.6 metres.*

5.2 Stage 2 – operational stage access

During the operational stage the main operations and maintenance facility will be located at the Delburn Terminal Station site with car parking provided for the anticipated permanent staff.

5.3 Stage 3 – re-powering or de-commissioning stage access

Access requirements for re-powering or de-commissioning stages are expected to be similar to that of the construction stage of the project.

6.0 Traffic Generation and Impact Assessment

6.1 Traffic Generation

6.1.1 Stage 1 - construction

The subsequent sections outline the estimated traffic generation during the construction of the Delburn Terminal Station, the estimates are likely to change once a nominated contractor is commissioned later in the project process and a subsequent TMP is developed.

Traffic generation estimates were made based on material quantities provided by DWFPL and assumptions made by AECOM. The volumes used throughout this TIA report have been conservatively estimated for each activity and are expected to be lower in practice.

The subsequent subsections outline the traffic generation for the construction phase from internal (local roads, and intersections) and external sources to demonstrate the traffic impacts of the project.

6.1.1.1 External traffic generation

An estimate of the total external construction related vehicles to and from the Delburn Terminal Station site and associated infrastructure locations is provided in Table 6-1 by vehicle type and origin. This includes vehicle generation associated with the delivery of OD and other terminal station parts as well as any externally sourced material.

Table 6-1 Estimate of external traffic generation during construction of Delburn Terminal Station

Vehicle Type	One-way trips	Origin	Comments / Assumptions
OD Trailer	8	Ports	OD parts (Transformer etc.)
Truck and Dog Trailer	3,118	Princes Freeway	Cement, concrete sand and cable bedding sand delivery
Rigid trucks	20	Princes Freeway	Water delivery for dust suppression and concrete batching
Other Heavy Vehicles	200	Princes Freeway	Support vehicles required for cable laying and parts delivery
Light vehicle	5,940	Princes Highway/ Mirboo–North Trafalgar Road	Workforce
Total OD vehicle trips	**8**		
Total heavy vehicle trips	**3,338**		
Total light vehicle trips	**5,940**		

6.1.1.2 Internal (or inter-site) traffic

The on-site concrete batching plant will generate vehicle trips when material is transported to the Delburn Terminal Station. This includes vehicle generation associated with the delivery of aggregate materials from the on-site quarry and concrete produced from the batch plants.

Two temporary batch plants are expected to be located along Smiths Road. They will produce concrete for the terminal station foundation and any transmission tower/pole footings.

The terminal station foundation will need to be poured in a single day, and has been estimated by DWFPL to require 800m^3 of concrete. A concrete agitator can carry up to 7m^3 of concrete, resulting in an estimated 114 one-way vehicle trips required for the foundation pour. It is expected that at most, foundation pour will consist of 17 one-way trips per hour, over an approximate seven hour working day time period. Hourly traffic during the pour may be reduced should the pour be spread out over a 10 hour working period.

Traffic originating from the batching plants will travel via the Strzelecki Highway (B460) and Smiths Road priority intersection and onwards to the terminal station construction site.

An estimate of the total internal vehicles to and from the Delburn Terminal Station site is provided in Table 6-2 by vehicle type and origin.

Table 6-2 Estimate of internal traffic generation during construction of Delburn Terminal Station

Vehicle Type	One-way trips	Origin	Comments
Concrete agitator	115	Batch plants on site via Smiths Road	Terminal station foundation, transmission tower/pole footings
Truck and Dog Trailer	1,908	Quarry on site via Smiths Road	Aggregate, gravel delivery
Total heavy vehicle trips	**2,023**		

6.1.2 Stage 2 - operational stage

The ongoing operation of the Delburn Terminal Station would be monitored by staff onsite associated with the Delburn Wind Energy Facility. It is estimated that approximately 2 permanent staff will be on site who would commute to and from the site every day.

Typical duties of staff are likely to include:

- Site track reviews and minor maintenance if required.
- Routine wind farm component maintenance (turbine, generators, etc.)
- Other general repairs and monitoring.

It is likely that service vans would be travelling around the Delburn Wind Energy Facility site on an ad-hoc basis attending to any requirements. Minor additional traffic generation of approximately 1 truck per week may also be required for the delivery of items to aid in maintenance activities (or waste removal).

Major works are not usually required in the first 25 years of terminal station operations, however in the event of major works being required then an OD vehicle delivery maybe required, for example a transformer may need to be replaced.

6.1.3 Stage 3 - re-powering or de-commissioning stage access

Traffic generation for any of these potential Stage 3 works are likely to be similar or less than the construction phase. Given such activities would occur at the end of the wind farms lifecycle (approximately 25-30 years from opening), an updated TIA and TMP would be required at this time.

6.2 Peak vehicle frequency and impact assessment

6.2.1 Stage 1 - construction

For the purpose of this TIA, the peak hour volumes have been calculated to represent a conservative estimate of the maximum traffic generated by the project's construction at any given point. It is noted that these estimates are considered conservative as the conditions assumed are unlikely to occur simultaneously.

The construction contractor will typically operate during normal construction hours from Monday to Friday between 7.00am to 6.00pm, with Saturday operations occurring between 7:00am till 4:00pm. During the peak construction period, peak trips are expected to occur in a one-hour period between 6:00am and 7:00am. Working time periods may change during specific site activities such as during the foundation pour in which works cannot be stopped. In such instances prior notice would be given to local stakeholders (and if required local community).

At its peak, the project is estimated to provide direct employment to 9 full time equivalent workers. As such, workforce commute is expected to generate up to 9 light vehicle trips within the morning peak. It is estimated that 60% of the workforce is expected to arrive along Strzelecki Highway (B460) from the

north, while the remaining 40% is expected to arrive along Strzelecki Highway (B460) from the south. The final distribution of workforce trips would be verified once the nominated contractor has been engaged, however impacts associated with changes in the workforce distribution are likely to still be negligible given the rural road network and times of travel.

The busiest construction periods are expected to occur when the DWEF is also under construction. As such, the construction traffic generation has been calculated to include estimated traffic from the DWEF project. A full breakdown of the traffic calculations and assumptions associated with the DWEF project can be found in the DWEF TIA.

Construction traffic generation was calculated based on a materials quantity list provided by DWFPL utilising the following process:

- Daily construction vehicle trips were assumed to be spread linearly throughout a 10-hour working day with 20 working days in an average month
- Peak construction traffic flows were mapped along Strzelecki Highway (B460) and at key access points
- Traffic flow diagrams were developed showing the predicted traffic impacts on the local road network. These are provided in Figure 10.

Adopting a conservative scenario where vehicles are predicted to both arrive and depart from a site during the morning peak period, the predicted impact on the local road network from project related traffic is summarised in Table 6-3 and shown diagrammatically in Figure 10. It is noted that on the day of the terminal station foundation pour, peak traffic volumes at intersections may increase by up to 17 vehicles per hour.

Table 6-3 Predicated construction stage traffic impacts

Intersection	Existing Peak Two Way Traffic Volume*	Estimated Peak Two Way Traffic Volume**	Estimated Increase in Intersection Use^	
			Left Turns	Right Turns
Strzelecki Hwy - Deans Road	480	536	6^^	5
Strzelecki Hwy - Smiths Road	380	424	0	1

Notes: * *Assumed to be equal to 10% of Two Way AADT. Two Way AADT volumes can be found in Table 3-2.*

** *Includes existing traffic volumes from both wind farm and terminal station works, heavy vehicles and light vehicles.*

^ *Increase in intersection use only considers turning movements made from main road into access road. It is assumed that the opposite movement from the access track to the main road is made at an off-peak time.*

^^ *It is expected that there will be an additional 17 one way trips during the foundation pour which occurs over the span of a day.*

As shown from Table 6-3 the predicted worst-case construction stage traffic impacts are predicted to be negligible given the low existing rural traffic volumes. Accordingly, even if more intensive usage is required during certain stages of the project there will be ample road operational capacity to facilitate, given a typical one-way road capacity is 900 vehicles per hour.

It should be noted that this TIA considers traffic operational impacts and there is potential for asset impacts in terms of heavy vehicles causing dilapidation of existing road surfaces. Such issues will need to be addressed at part of the projects TMP in consultation with local stakeholders where agreement on remediation extents and timings can be agreed.

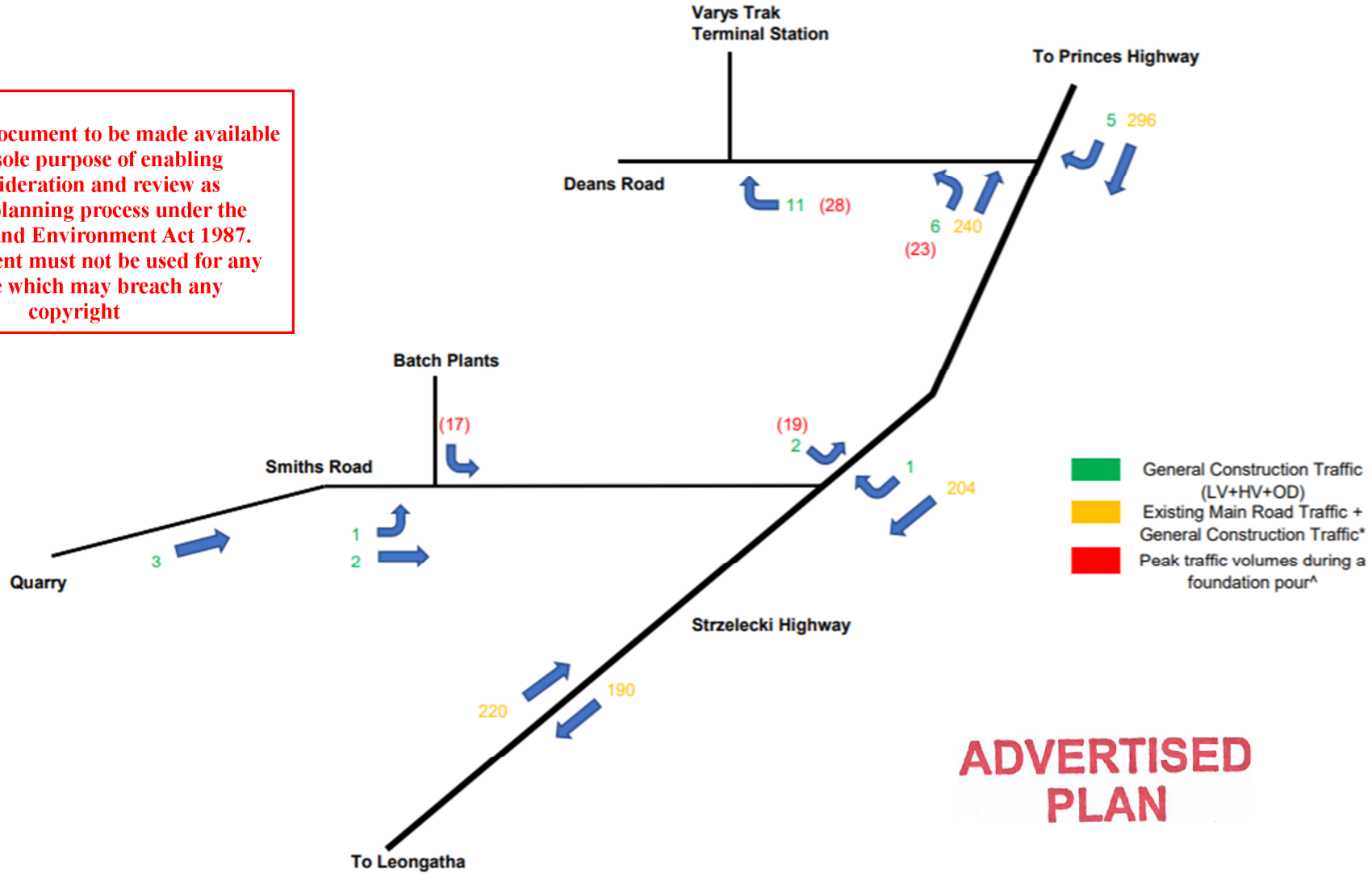
6.2.2 Stage 2 - operational

It is predicted that up to 2 staff vehicles per day will commute to and from the site each day. These are expected during the morning peak between 8am and 9am. Given the low operational traffic generation no detrimental impacts to the local traffic operations are expected.

6.2.3 Stage 3 - re-powering or de-commissioning

Traffic impacts for any of these potential Stage 3 works are likely to be similar or less than the construction phase. Given such activities would occur at the end of the terminal station's lifecycle

(approximately 25-30 years from opening), an updated traffic impact assessment would be required to also take into consideration any increases in background traffic due to both nominal traffic growth and potential land use changes over time.



* Includes traffic generated by Delburn Wind Energy Facility project works

^ Note that when the foundation is being poured, traffic at related intersection may increase by up to 17 vehicles per hour during the peak period.

Figure 10 Morning peak traffic flow diagram estimated during the construction period

7.0 Preliminary Construction Traffic Route Assessments

7.1 Potential OD transport routes – port assessment

At this stage the delivery port for materials and components has not been selected. It has been noted that previous assessments for the Delburn Wind Energy Facility project had adopted the Port of Hastings as the nominated port for component deliveries to the site, however this needs to be further investigated.

Discussions with relevant ports and detailed route assessments by the nominated transport contractor will be required so that these can be captured in any subsequent TMP(s) and approvals gained for the project.

At this stage AECOM have undertaken a high-level desktop analysis of the available port delivery options via the Port of Hastings, Port of Melbourne, Port of Geelong and Port of Portland which are all be considered to give greatest flexibility for delivery of materials. The routes associated with each have been summarised in terms of initially identified major constraints for any OD transportation of components to the project site. The OD routes have been assessed and derived at this stage as follows:

- Using the National Heavy Vehicle Regulator (NHVR) route planner to determine applicable routes
- Past knowledge of used OD routes uses for wind farm projects to the west of Melbourne
- Review of DoT (VicRoads) height and weight restrictions (noting a more holistic review will be required and undertaken by the relevant transport contractor, e.g. any bridges crossed may require strength assessments, Powercor assessments of routes to identify overhead constraints etc.).

Each route has been assessed up to a common location, at the intersection of Princes Highway and Princes Freeway in Narre Warren. From this location onwards the transport routes to the Delburn Terminal Station will be the same onwards to the site access point. A summary of the port route options is shown in Figure 11 and discussed further in the subsequent report subsections.

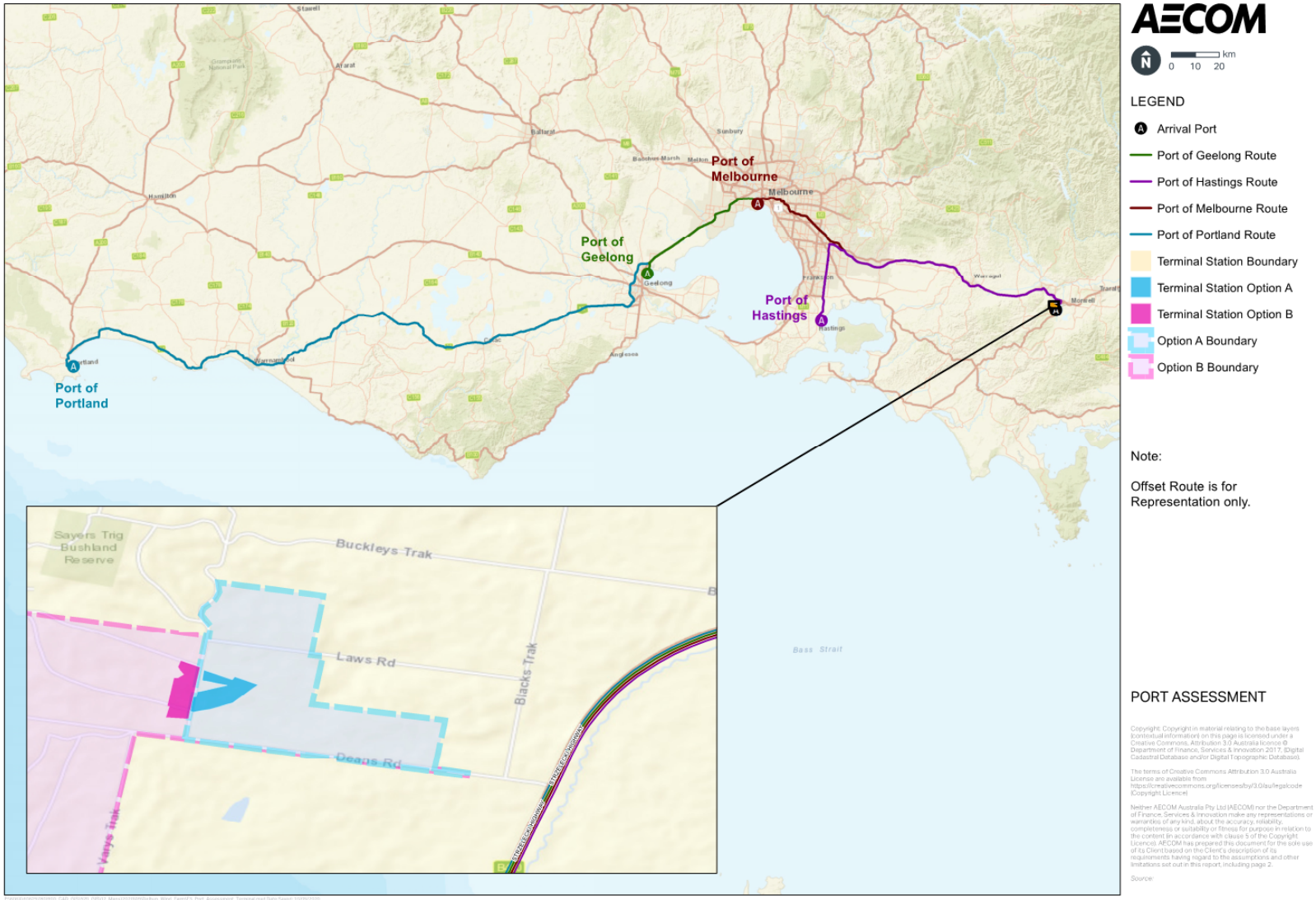


Figure 11 Potential OD transportation options from assessed ports

7.1.1 Route restriction assessment

A preliminary assessment of the existing restrictions and restraints along the potential delivery routes for OD and OSOM vehicles has been undertaken due to the potential for conflict between overhead restrictions and the delivery of the Delburn Terminal Station transformer.

The mounting height of the transformer on the OD transport vehicle will increase the overall height requirements of the vehicle. The exact configuration of the transport vehicles is not known at this stage of the project. A high-level review of potential along each route was undertaken against aerial imagery and publicly available VicRoads bridge height and loading restriction databases. Constraints including, overhead restrictions less than 5.5m, road weight limits and potential road geometry challenges arising from the review are detailed below in Table 7-1. The tallest loaded vehicle, used for transformer delivery, is expected to be approximately 5.2m tall.

It is noted that the route restriction assessment is preliminary only for the purposes of planning, with a more detailed assessment required to be undertaken once the transport contractor is engaged, the preferred route is determined and component dimensions are known.

No survey of powerlines was available at the time of this assessment.

Table 7-1 Potential OD transportation route height and weight restrictions

Port	Route locations	Potential restrictions
Port of Hastings	M1 at multiple locations between Moe and Morwell	5.1 metre height restriction
	South Gippsland Freeway at multiple locations near Hampton Park.	5.2 metre height restriction
	A780/M780 at multiple locations	Modifications will be required to most roundabouts
	Port of Hastings	Port of Hastings Western Port is privately operated by Bluescope Steel Corporation and will require approval from Bluescope.
Port of Melbourne	M1 between Port Melbourne and Docklands	49.5 tonne weight restriction
	M1 between South Wharf and Chadstone	4.65 metre height restriction
	Webb Dock Drive	Approval required for use by Port of Melbourne
	Southern Link Tollway (M1)	Written clearance from Citilink required
Port of Geelong	M1 between Port Melbourne and Docklands.	49.5 tonne weight restriction
	M1 between South Wharf and Chadstone	4.65 metre height restriction
	M1 between Little River and Werribee.	4.8 metre height restriction
	Webb Dock Drive	Approval required for use by Port of Melbourne
	Southern Link Tollway (M1)	Written clearance from Citilink required
Port of Portland	Bridgewater Road	5.4m height restriction
	M1 between Port Melbourne and Docklands.	49.5 tonne weight restriction

	M1 between South Wharf and Chadstone	4.65 metre height restriction
	M1 between Little River and Werribee.	4.8 metre height restriction
	Webb Dock Drive	Approval required for use by Port of Melbourne
	Southern Link Tollway (M1)	Written clearance from Citilink required
All routes	Princes Highway at Princes Way (Princes Way Overpass)	5.16 metre height restriction (overpass)
	Princes Highway at Darnum Shady Creek Road (Darnum Shady Creek Road Overpass)	5.4 metre height restriction (overpass)
	Princes Highway at Old Gippstown Drive (Old Gippstown Drive Overpass)	5.2 metre height restriction (overpass)
	Princes Highway at Fowler Street (Fowler Street Overpass)	5.1 metre height restriction (overpass)
	Princes Highway at Coalville Road (Coalville Road Overpass)	5.19 metre height restriction (overpass)

7.2 Proposed OD transportation route – local access assessment

7.2.1 Methodology

The local access assessment for the proposed OD vehicle transportation component delivery has been undertaken from the Princes Freeway (M1) to the proposed site access point (01). The purpose of the analysis was to determine possible conflicts and constraints for OD vehicles accessing the site, including likely extents of native vegetation / significant tree removal, impacts to road furniture, utilities and privately-owned land. The review is limited to a 2D perspective and based on aerial imagery, accordingly the assessment will need to be reviewed once a topographical survey has been completed and consider all aspects, including other geometric requirements (e.g. road grades, superelevation, etc.)

The assessment has been undertaken for planning purposes only at this stage and is based on several assumptions. Further analysis will be required once the nominated port(s) have been chosen for delivery and a transportation contractor has been hired (whom will conduct a more detailed OD transport assessment). This can then be considered further as part of the subsequent TMP for the project.

The following methodology has been adopted in this local access OD route assessment:

- Swept path analysis was undertaken using AutoTurn Pro version 10.2.1.29 for a transformer delivery vehicle, which is considered a conservative case swept path (see Section 7.2.2 for design vehicle dimensions).
- The vehicle swept paths were undertaken at select locations, identified visually, against high resolution aerial imagery (Nearmaps, 2020), with overlays of native vegetation and identified significant trees also applied (provided in GIS format by DWFPL, 10/03/2020).
- Vehicles leaving the site are assumed to be able to exit using similar paths to the delivery vehicle.
- A site visit has undertaken at key intersections along the expected terminal station OD delivery route to identify any additional local features and constraints that were not clear in the aerial imagery.
- It is noted that as swept path analysis was undertaken at targeted key locations. There may be additional areas throughout the delivery route that may have constraining geometry or features that have not been highlighted. These will need to be considered further by the nominated transport contractor once engaged.

7.2.2 Design vehicle

The largest delivery vehicle requiring access to the Delburn Terminal Station is expected to be the transformer delivery vehicle.

AECOM have modelled the transformer delivery vehicle as a 44 metre long low loader, as shown below in Figure 12, which is expected to represent the upper size range of possible transformer delivery vehicles. It is noted that the exact delivery vehicle and transformer dimensions are not yet known and will be confirmed once a supplier and delivery contractor are engaged, however it is understood that delivery vehicles in the order of 39 metre length have previously be used on similar AusNet terminal station projects.

A minimum turning radius adopted for the design vehicle of 22 metres was adopted.

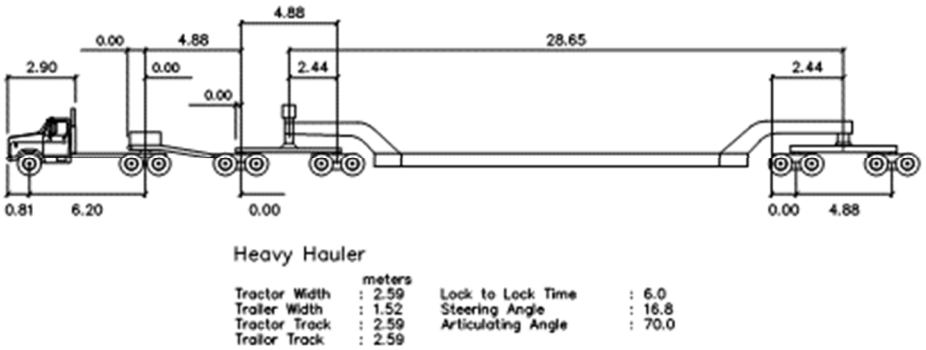


Figure 12 Modelled transformer deliver vehicle

7.2.3 Identified horizontal pinch points

OD swept path analysis was undertaken at four potential pinch point locations which are outlined in Table 7-2with the respective locations shown in Figure 13 and swept paths provided in Appendix **C**.

Table 7-2 Swept path analysis – preliminary identified conflicts summary (refer Appendix C for swept paths at each identified pinch point)

Pinch Point (see Figure 11)	Location	Preliminary identified conflicts
PF	Princes Freeway (M1) off-ramp	Vegetation, mostly shrubs and small trees (north-west and south-west of intersection) W-Beam road safety barriers (south-west of intersection)
MR	Strzelecki Highway (B460) and Marretts Road priority intersection	Raised central median (semi-mountable) Road verge (north-west of intersection) There are also powerlines, a swale and a property fence located near the intersection, however these are currently not impacted by the design swept path .
DR	Strzelekci Highway and Deans Road priority intersection	Design vehicle appears to be able to utilise existing intersection pavement extents without impact to roadside features.
VT	Deans Road / Varys Track intersection	Vegetation, mostly trees (north-east and south-east of intersection)

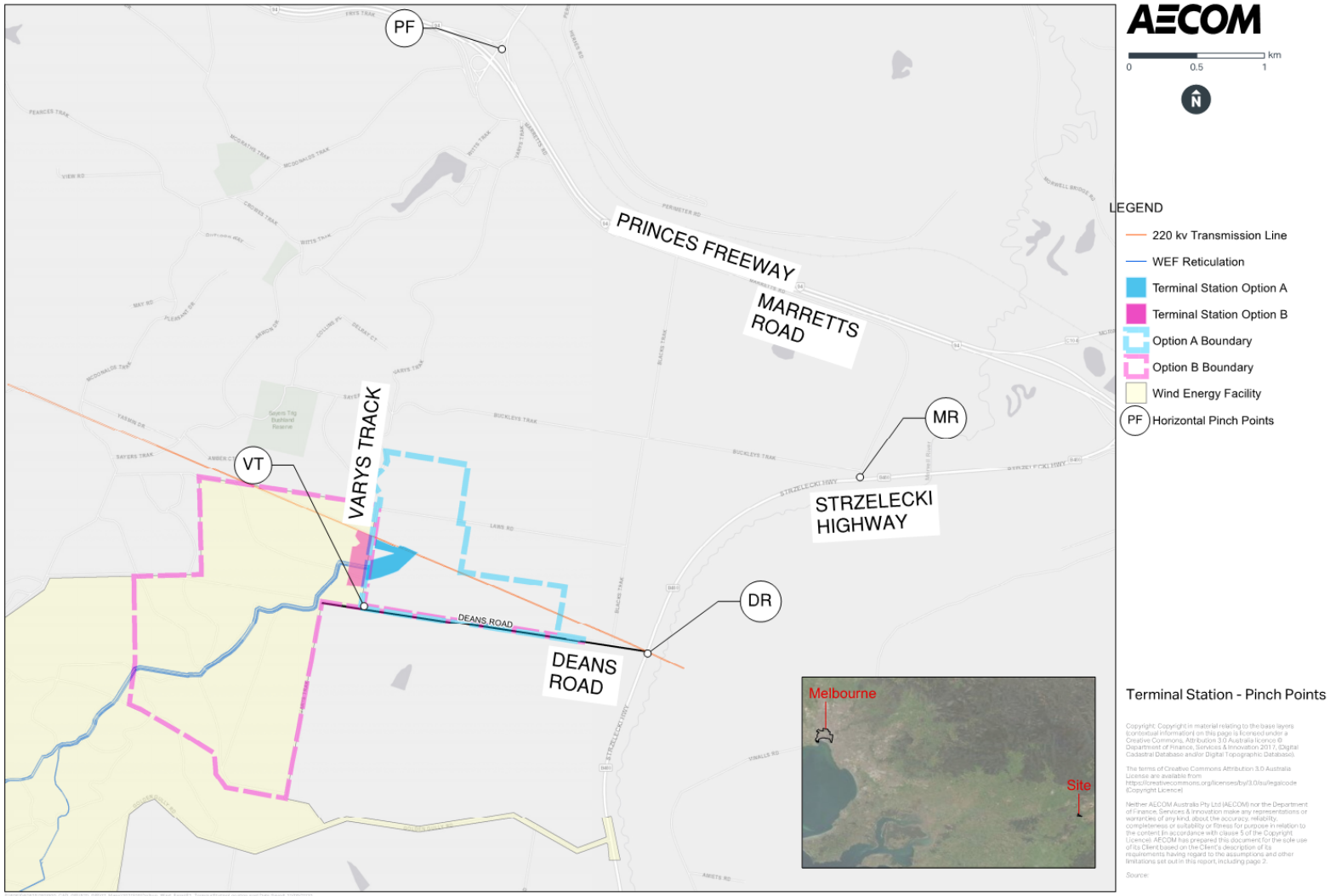


Figure 13 Horizontal pinch points for OD transformer delivery vehicle

8.0 Mitigation Measures

8.1 Site access point upgrades

8.1.1 Design vehicle requirements

Two site access points are proposed to be used during the construction of the Delburn Terminal Station which will both be accessed via priority intersections with the Strzelecki Highway (B460). Site access point 01 via Deans Road for the main site access and construction activities, and site access point 02 via Smiths Road to access the project batch plant and quarry. The location of the site access points is shown in Figure 9.

It is recommended that all access points intersect the public road network as a T-intersection, with a recommended intersection angle between 70-90 degrees in accordance with Austroads guidance.

A summary of the requirements for each of the site access points is provided in Table 8-1.

Table 8-1 Construction vehicle site access point requirements

Access Point No.	Design Vehicle			
	Left-in	Left-out	Right-in	Right-out
01 (Deans Rd)	12.5m HRV + AV	44m OD - transformer	44m OD - transformer	12.5m HRV + AV
02 (Smiths Rd)	12.5m HRV	12.5m HRV + AV	12.5 m HRV + AV	12.5m HRV

The access requirements for each access point have been developed based on the following assumptions:

- All OD vehicles access the site from the North (Princes Freeway and Marretts Road)
- Following delivery of components, OD delivery vehicles shorten and return to source (shortened OD vehicles noted as OD(S))
- OD delivery is required for the terminal station only and will only utilise the Deans Road access point
- Light vehicles can utilise access points from all directions
- 12.5 metre HRV vehicles utilised for concrete delivery and sourced from the batching plant via Smiths Road.
- Articulate Vehicles (AV) (e.g. truck and dog) require access from all directions

The turn-off from Deans Road to Varys Track (Pinch point VT) will require some clearing of adjacent trees to accommodate the OD transformer delivery vehicles.

Access point improvements for the Strzelecki Highway (B460) and Smiths Road priority intersection onwards to the projects batching plant and quarry accesses are considered as part of the overall Delburn Wind Energy Facility project.

8.2 Over-dimensional upgrades to public intersections

The critical turning movements along the OD route between Princes Freeway (M1) and the site access points occur at the intersections between Strzelecki Highway and Deans Road, and at the intersection between Princes Freeway off-ramp and Marretts Road.

Table 8-2 summarises some of the expected mitigation measures to be undertaken at these intersections based on the predicted OD swept paths. It is noted that additional operational controls will likely be in place such as OD escort vehicles, temporary speed reduction, potential OD delivery time restrictions and additional signage will be required in addition to the physical measures outlined

below (these would be developed in consultation with key stakeholders by the commissioned transportation contractor during TMP development). Temporary pavement widening is proposed to be provided at all intersections, where required, to safely accommodate the movement of OD vehicles, as listed in Table 8-2.

It is noted that in the project context, temporary pavement refers to a pavement widening constructed to a lower standard than the adjacent carriageway pavement (typically unsealed crushed rock) and used for OD vehicles to complete turning movements. These are maintained for the life of the project, in case component replacement is required. The temporary pavement is typically protected by removeable bollards or flexible barriers during the operational stage of the project to restrict use to OD vehicles only.

It is noted that all mitigation measured proposed in Table 8-2 relating to pinch points PF and MR are similarly required as part of the DWEF works. Any intersection modification works required for the delivery of the WEF components will be suitable for terminal station works.

Table 8-2 Identified intersection mitigation measures

Pinch Point	Intersection	Mitigation
PF	Princes Freeway – Marretts Road Intersection	The largest OD vehicle appears to be able to fit within the existing pavement footprint based on AECOM's swept path analysis. It is noted that minor changes to the design vehicle profile may result in modifications being required at the intersection, including: - Temporary removal of up to 5m of W-beam safety barrier on the Princes Freeway overpass approach. - Removal of some vegetation on the south-west side of the intersection - Road signs within the splitter island to be made removable
MR	Marretts Road – Strzelecki Highway Intersection	The largest OD vehicle appears to be able to largely fit within the existing pavement footprint based on AECOM's swept path analysis, however the following upgrades may be required: - Signs in splitter island to be made removeable - Minor widening of shoulder on north-east and north-west of intersection to accommodate the transformer delivery vehicle wheel paths
DR	Deans Road – Strzelecki Highway Intersection	The largest OD vehicle appears to be able to fit within the existing pavement footprint based on AECOM's swept path analysis.
VT	Deans Road / Varys Track intersection	Removal of vegetation and construction of temporary pavement to accommodate OD vehicle turning movements.

8.3 Austroads design guideline requirements

In addition to the access point and OD vehicle turning movement requirements detailed above, there are a number of design considerations outlined in Austroads Guide To Road Design Part 4 (AGRD4): Intersections and Crossings, and Austroads Guide to Road Design Part 4a (AGRD4a): Unsignalised Intersections. Key considerations include safe intersection sight distance and warrants for turning treatments – both of which are outlined below.

8.3.1 Sight Distance

AGRD4a provides three sight distance requirements for vehicles at intersections, which are defined as follows:

> **Approach sight distance (ASD)** - the minimum level of sight distance which must be available on a minor road for cars to be aware of the presence of an intersection, and for vehicles approaching the intersection at the 85th percentile of the operating speed to stop safely.

Safe intersection sight distance (SISD) – the minimum sight distance which must be provided on the major road at any intersection which provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation, and to decelerate to a stop before reaching the collision point.

Minimum gap sight distance (MGSD) – the minimum sight distance corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections.

Preliminary checks for the above sight distance requirements have been undertaken at all identified pinch points: Princes Freeway / Marretts Road, Marretts Road / Strzelecki Highway, Deans Road / Strzelecki Highway and Deans Road / Varys Track. Checks have been undertaken in accordance with AGRD4a. ASD, SISD and MGSD were achieved for all pinch points reviewed.

It is noted that checks have been undertaken utilising aerial imagery suitable for planning purposes and will need to be undertaken again during the detailed design of access points. All intersections were found to satisfy the sight distance criteria above.

8.3.2 Turning Treatment Warrants

Austroads Guide to Road Design Part 4: Intersections and Crossings details the warrants for turning treatments on major roads at unsignalised intersections. These guidelines compare the number of turning vehicles into an intersecting road with the total number of vehicles on the major through road. Basic (BA), Auxiliary Lane (AU) and Channelised (CH) left (L) and right (R) turn treatments are recommended depending on certain volume minima criteria (see Figure 14 for rural road criteria for a design speed greater than 100 km/h.

It should be noted that the Strzelecki Highway (B460) has a posted speed limit of 100 km/h and that no formal speed surveys have been undertaken to verify actual operating speeds of the road. As outlined previously following further review during development of the TMP with project stakeholders the speed limit should be reviewed to ensure safe operating conditions. These treatments are prescribed to separate through and turning traffic streams to improve safety while also minimising delay to through movements by queued turning vehicles.

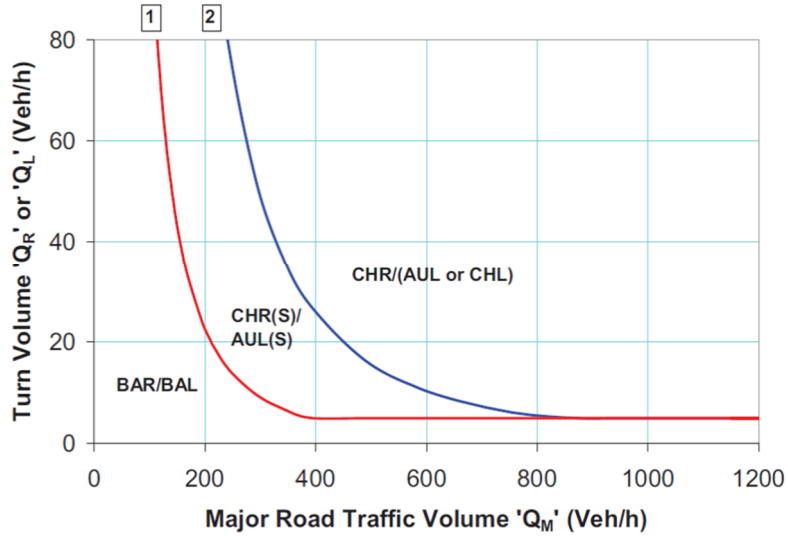


Figure 14 Austroads design guidelines for intersections (Design speeds ≥ 100km/hr)

Source: Austroads Guide to Road Design Part 4

With reference to Figure 14 and the estimated peak construction period traffic volumes (see Section 6.2.1 and Appendix B) the recommended turning treatments have been determined and summarised in Table 8-3. The identified turning treatments need to be considered further with stakeholder inputs during development of the TMP when potential speed restrictions may also be applied along with any

other mitigation measures. Other potential restrictions to turning treatment upgrades would need to be identified through concept design.

It is noted that when the Delburn Terminal Station foundations are poured, traffic at the Deans Road (DR) will temporarily exceed the threshold levels in which additional left turning treatments are recommended by Austroads. However, as the pour is only expected to occur over a single day, and represent a small portion of the construction period, additional left-turn treatments are not considered warranted. Further traffic control and mitigation measures, such as temporary speed reductions and traffic management are recommended during the foundation pour to manage the additional construction traffic (subject to agreement with key stakeholders).

Table 8-3 Intersection turning treatment requirements

Swept Path Ref. No.	Major Road	Minor Road	Current turning treatment	Required turning treatment	Comment
MR	Strzelecki Highway	Marretts Road	AUL, CHR	AUL, CHR	No change required
DR	Strzelecki Highway	Deans Road	AUR	BAL, BAR	It is noted that the BAL treatment is recommended in AustRoads for the Deans road intersection based on the existing traffic volumes. Left-turn movements into Deans Road are only predicted to increase by 2 vehicles per hour during the AM peak. An investigation, in consultation with RRV, should be undertaken to determine if any road infrastructure improvements are to be implemented.
SR	Strzelecki Highway	Smiths Road	BAL CHR (intersection upgraded in 2015)	BAL, CHR	No change required

8.4 Road section upgrades

Deans Road and Varys Track, which will be used by all Delburn Terminal Station construction traffic, are single-lane two-way roads. Both Deans Road and Varys Track vary in width but are generally around 3m which is expected to be suitable for their current usage and traffic volumes.

During construction, the increased vehicle usage, on these single-lane two-way roads can result in two concerns with regards to safety risk and reliability of the local road network:

1. The number of vehicles generated by the development travelling along a road of an inadequate width increases the likelihood of a fatal or serious injury crash. This is further emphasised with the large number of heavy vehicles generated during the construction phase.
2. The increased traffic volumes and number of heavy vehicles poses a potential durability and reliability issue to the performance of the existing pavement, which is unlikely to have been designed for the proposed construction vehicles. This risk is further increased during and following a wet weather period.

There are many options that may be employed to mitigate the above factors, including:

- Widening of the road between Strzelecki Highway and the Delburn Terminal Station
- Providing passing bays at key locations along Deans Road, in conjunction with vegetation clearing to accommodate wide loads
- Traffic management measures (e.g. controlling access movements into and out of the site, notably during OD vehicle entry and exit)
- Reduced speed limits
- Upgrade of road pavements
- Regular inspections and maintenance operations
- Installation of advanced warning signs
- Driver's code of conduct

Further to the advice from the appropriate road authority, the adoption of an independent road safety audit (pre-qualified by the DoT) could assist with determining the appropriate treatments.

It is recommended that the mitigation measures adopted be determined on a case-by-case basis considering localised constraints and the duration and impact of construction activities, in close consultation with the key project stakeholders during development of the project's TMP.

8.5 Future land use development and infrastructure

It is unclear at this stage if there is any proposed local land use development or infrastructure proposals. Liaison with key stakeholders should be undertaken prior to construction or delivery of wind farm components to ensure that any such impacts are considered and addressed, likely as part of the projects TMP.

8.6 Safety considerations

Several potential safety considerations have been outlined at this preliminary stage of the project, these and other potential issues which may require control measures should be considered in consultation with DOT/RRV when the projects TMP is developed.

8.6.1 Access and operating speeds

Construction vehicle usage of the nominated access points during the construction stage of the project will result in an increase in slowing and turning vehicles along the public road network at these locations. This change in traffic conditions may result in an increased risk of vehicle collisions.

It is recommended that subsequent design stages, including development of the TMP, recognise and mitigate these risks where possible, with likely mitigation measures including increased signage, reduced posted speed limits, incorporation of widened or overtaking lanes where necessary.

8.6.2 Risk of head-on collisions

As detailed above, the project is expected to generate traffic throughout its lifecycle, with high traffic periods expected during the construction and re-powering/decommissioning stages of the project. The increased traffic may also increase the risk of head-on collisions within the local network, particularly during peak hour along the narrower unsealed road of Deans Road. Risk mitigation measures for head-on collisions are to be documented as part of the TMP.

8.6.3 Noise and dust

Construction traffic, particularly heavy and over-dimensional vehicles are expected to generate additional noise and dust along the public road network than is currently experienced, particularly along unsealed roads. While there are very few dwellings near the project impacted by these works, mitigations measures will nevertheless be required to minimise environmental impacts. Noise management and dust suppression methods will be addressed within the environmental impacts statement (EIS).

8.6.4 OD and construction vehicle impacts

OD and construction vehicles accessing the wind farm are likely to impose loading profiles on the road network that may not have been accounted for when designed which may lead to an increased risk of accelerated pavement deterioration, or damage to existing structures such as culverts.

The existing unsealed pavement at Deans Road in particular, is unlikely to have been designed for such large vehicle loads associated with OD componentry, or frequent concrete truck movements. Increased risk of pavement ravelling and shape-loss through these roads is expected during the construction phase, which can be hazardous to road users. Controls and management throughout the project life are required to mitigate these risks. As Smiths Road is used frequently by quarry trucks and equipment and plantation trucks, the risk to this road is likely to be significantly reduced.

Road treatments and upgrade works will require consultation and approval from relevant authorities, including RRV and the impacted councils. Treatments will be documented within the TMP.

8.6.5 Adverse weather

Adverse weather conditions, including periods of significant rain, are likely to carry increased risk to road users during the construction period. Low visibility during peak hours, or rainfall events around construction generated pot-holes can increase the risk of accidents. DOT/RRV have noted that the area can experience heavy fog at times. Consideration of working hours and possible counter-measures will be addressed in the TMP.

9.0 Summary and Next Steps

9.1 Summary

In summary this TIA has shown that there is unlikely to be a material traffic capacity impact on the local road network during various project stages of the proposed construction of the Delburn Terminal Station.

The TIA has highlighted some potential mitigation measures that should be considered further to facilitate safe vehicle access to the site, which can be further considered and finalised as part of the TMP and EIS for the project in consultation with key stakeholders.

9.2 Next steps

9.2.1 Traffic Management Plan

Typically, on wind farm projects, following planning approval, a condition of the permit will be to produce a TMP for the project. The TMP would be developed when a contractor is commissioned and may consider the following:

- Key stakeholder inputs and requirements
- Confirmation of proposed construction program and volumes
- Origin of materials and personnel
- Final site access design and traffic management measures (speeds and signage) to facilitate the safe movement of vehicles to and from the site.
- Pre-road condition surveys and maintenance agreements with key stakeholders.
- Over dimensional load permit application for travel
- Control measures, for example:
  - Roles and responsibilities
  - Training and site inductions
  - Vehicle access
  - Operating and working hours
  - Environmental measures
- Outline monitoring, inspection and auditing of the TMP

The TMP shall also address the following items raised by stakeholders:

- Further intersection and swept path design to be undertaken to ensure all standard vehicles can turn within their designated traffic lane, and that any works or modifications to road conditions that occur following this report are captured
- Additional stakeholder consultation to identify state and private school bus operators that may be impacted, and any other road users impacted by the development
- Further engagement and coordination with RRV regarding the modification of warning and regulatory signs in the area
- Road safety audit (RSA) may need to be conducted at key areas of the proposed route, including where road safety barriers are proposed to be temporarily removed or temporary pavements are proposed

9.2.2 Road and intersection design development

In parallel to the development of a TMP, the concept plans and proposed mitigation measures are to be further developed. As the project progresses and the site layout, construction methodology and delivery logistics are progressed and finalised, the following will need to be further developed in consultation with key stakeholders (e.g. RRV and Council):

- Proposed road treatments and intersection upgrades
- Road widening
- Traffic management measures and signage (MoAs with Council)
- Utility impacts (unknown)
- Further design steps may identify the need for::
  - Updated treatment extents
  - Pavement profiles and reinstatement methods
  - Proposed linemarking and signage
  - 3d design and earthworks extents

RRV have noted that intersection design approvals can take from 6 to 12 months to be processed, which must be accounted for in the project programme. All designs on arterial roads must be completed in accordance with the RRV developer funded checklist.

Appendix A

Crash data analysis

Appendix A Crash data analysis

VicRoads CrashStats was interrogated for the latest available crash data between 2013 and 2019 for relevant roads within a 2 kilometre distance of the project site. Figure 15 shows the location of the crashes in proximity to the Delburn Terminal Station development, with Table 9-1 providing a summary of the recorded crashes.

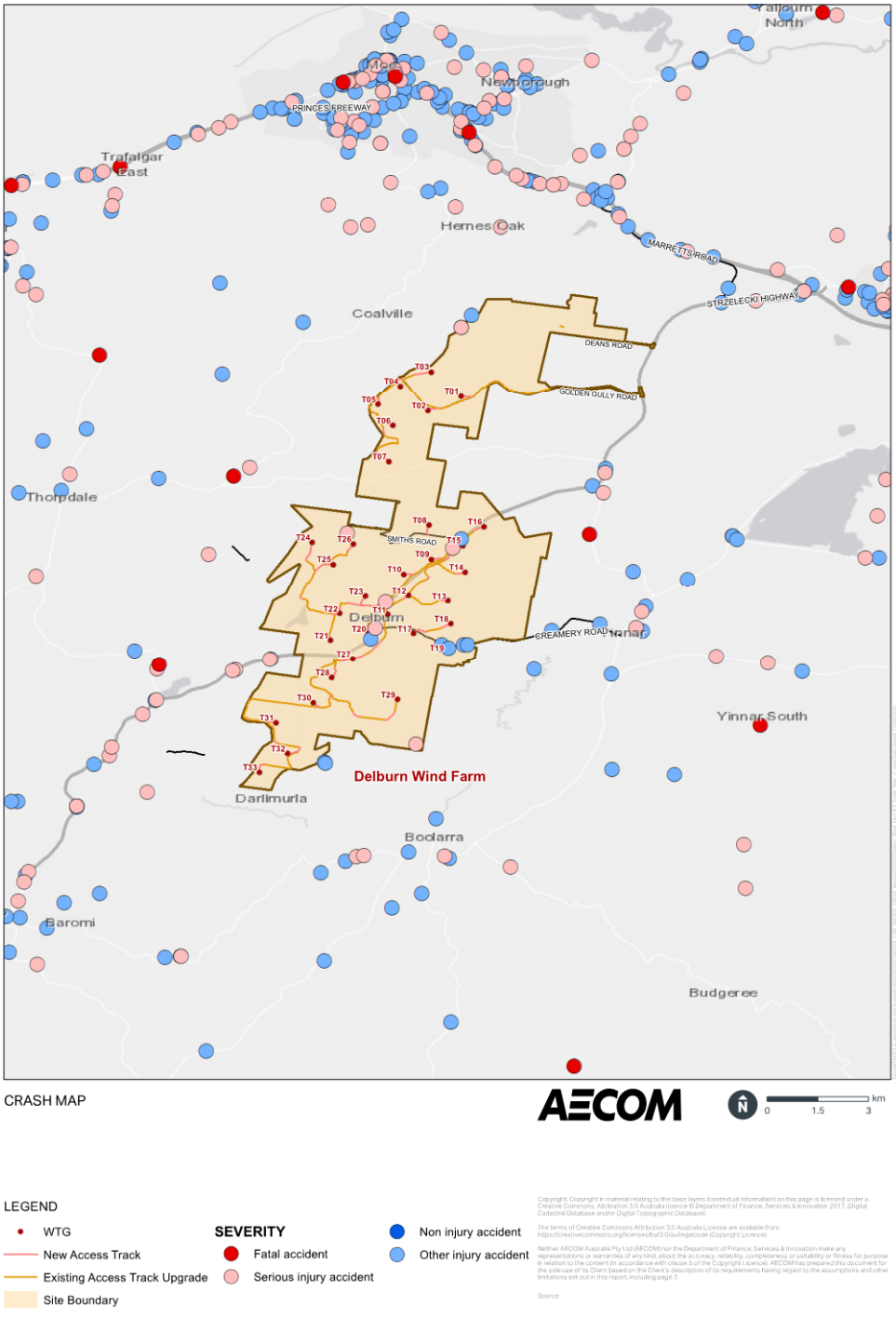


Figure 15 Local of crashes near Delburn Terminal Station

Table 9-1 Summary of recorded crashes for past 5 years

Road	Crashes
Marretts Road	• A multiple injury, vehicle to vehicle right turn collision was recorded on the 11th August 2016 at the intersection between the Princes Highway (M1) offramp and Marretts Road • A serious injury vehicle to object collusion was recorded on the 28th September 2017 approximately 150 metres south of the intersection between Marretts Road and Varys Track. • An injury off carriageway collision was recorded on the 28th September 2016 approximately 450 metres north of the intersection between Marretts Road and Strzelecki Highway. It occurred at night and the driver was recorded as driving under the influence related.
Deans Road	• No serious of fatal crashes were recorded along this road over the last 5 years.
Smiths Road	• No serious of fatal crashes were recorded along this road over the last 5 years.
Strzelecki Highway	The majority of crashes along Strzelecki Highway within the site occur at intersections. As such, focus will be placed on the details of crashes which have occurred at the intersections between Strzelecki Highway and relevant access roads. <u>Marretts Road Intersection</u> • An injury crash was recorded on the 26th January 2018. It occurred during the day and the accident classification was a right turn related vehicle collision. <u>Deans Road Intersection</u> • No serious of fatal crashes were recorded near this intersection over the last 5 years. <u>Smiths Road Intersection</u> • An injury crash was recorded on the 29th of November 2013. It occurred during the day and the accident classification was a non-overtaking related head on collision.

Appendix B

Terminal Station Configurations

delburn WIND FARM

Disclaimer:
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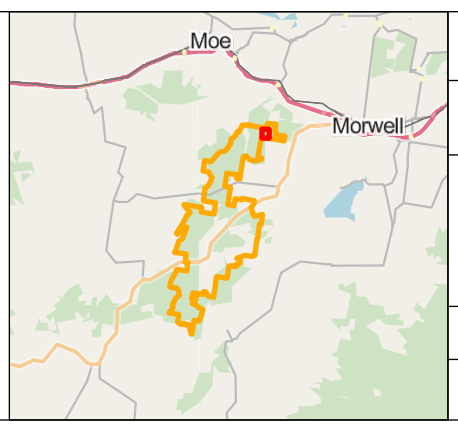
- Terminal Station Works Area
- Construction Compound
- Terminal Station Layout
- Transmission Access Track Upgrade
- Existing 220kV Powerline
- Existing Easement
- Watercourse



• PROJECT
Delburn Wind Farm

• TITLE
Terminal Station Option 2

• DATE 26/08/2020	• PRODUCED I.Mackey
• SCALE 1:2,000 @ A3	• CHECKED I.Mackey
• STATUS Draft	• APPROVED P.Marriott

0 25 50 100 Meters N

• DRAWING No.	• REV
DWF_OVR_027A_02A TS2	02A

delburn WIND FARM

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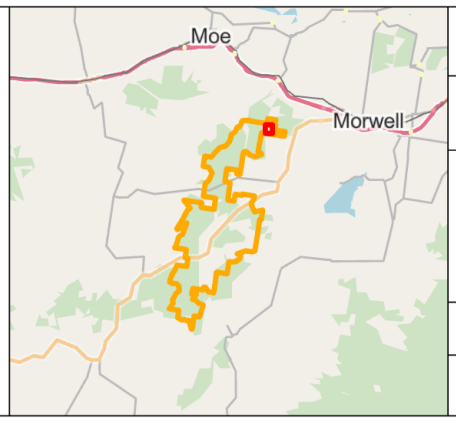
- Proposed Future Subdivision
- Terminal Station Layout Option 2
- Transmission Access Track Upgrade
- Terminal Station Access
- Construction Compound
- Battery Energy Storage Site Boundary
- Wind Farm Electrical Reticulation
- Existing Easement
- Existing 220kV Powerline



• PROJECT
Delburn Wind Farm

• TITLE
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• DATE 23/06/2020	• PRODUCED I.Mackey
• SCALE 1:2,000 @ A3	• CHECKED I.Mackey
• STATUS Draft	• APPROVED P.Marriott

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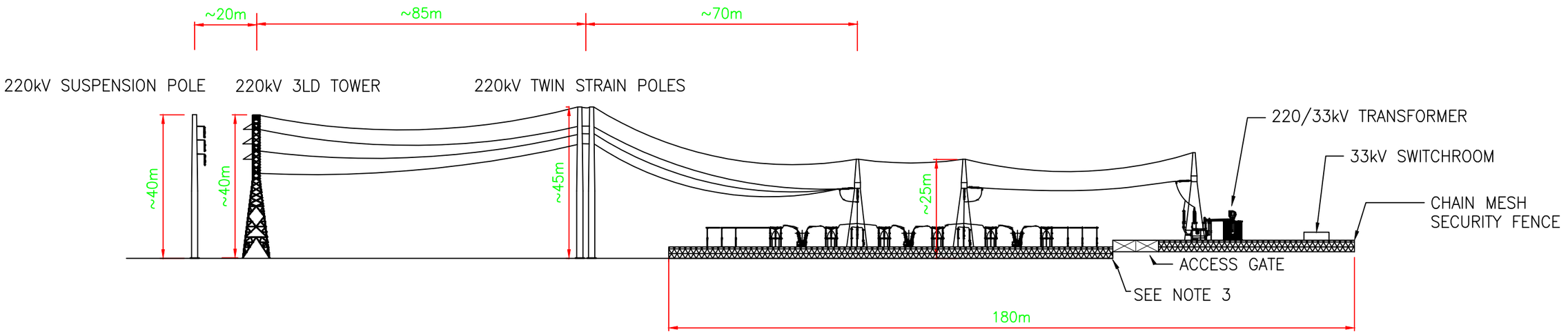


NORTH–EAST ELEVATION

NOTES:

1. THIS DRAWING IS PROVIDED FOR PLANNING PURPOSES ONLY AND THIS INFORMATION SHOULD NOT BE RELIED UPON FOR DESIGN OR CONSTRUCTION.
2. DRAWING IS NOT TO SCALE.
3. TERMINAL STATION BENCH CONSISTS OF TWO LEVELS.
4. SITE TOPOGRAPHY OUTSIDE OF THE TERMINAL STATION IS NOT A TRUE RESPRESENTATION OF SITE CONDITIONS. LOCAL GRADING AROUND 220KV LINES STRUCTURES EXPECTED.

REFERENCE DRAWINGS			REVISION				
			03.06.20	1	ISSUED FOR PLANNING PURPOSES ONLY,	SR	AST
DRAWING TITLE	DRAWING No.		DATE	REV	DESCRIPTION	BY	CONTRACTOR

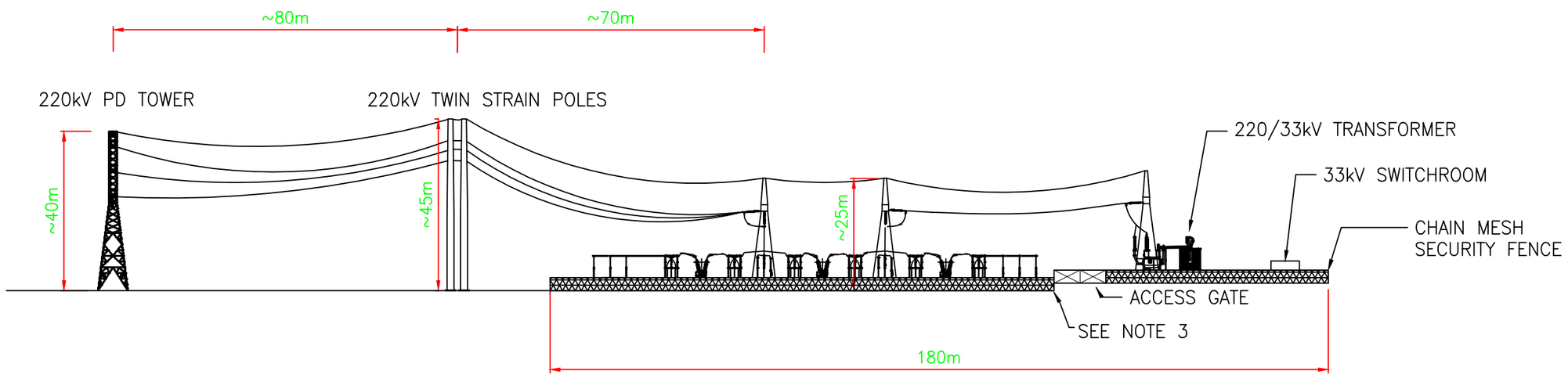
DRAWN SR
ENDORSED REV 1
ENDORSED DATE
ISSUED
Spec No.
Order No.
Contractors No.

DELBURN WIND FARM PROJECT
OPTION 1 - SINGLE CIRCUIT CUT-IN
SECTION VIEW

AusNet services No
SKT-DELBURN-SEC-OP1 1

AusNet Services STD A2
400 X 566mm A2

[A2]



NORTH–EAST ELEVATION

NOTES:

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REFERENCE DRAWINGS			REVISION				
			03.06.20	1	ISSUED FOR PLANNING PURPOSES ONLY,	SR	AST
DRAWING TITLE	DRAWING No.		DATE	REV	DESCRIPTION	BY	CONTRACTOR

DRAWN SR
ENDORSED REV 1
ENDORSED DATE
ISSUED
Spec No.
Order No.
Contractors No.

DELBURN WIND FARM PROJECT
OPTION 2 - DOUBLE CIRCUIT CUT-IN
SECTION VIEW

AusNet services No
SKT-DELBURN-SEC-OP2 1

AusNet Services STD A2

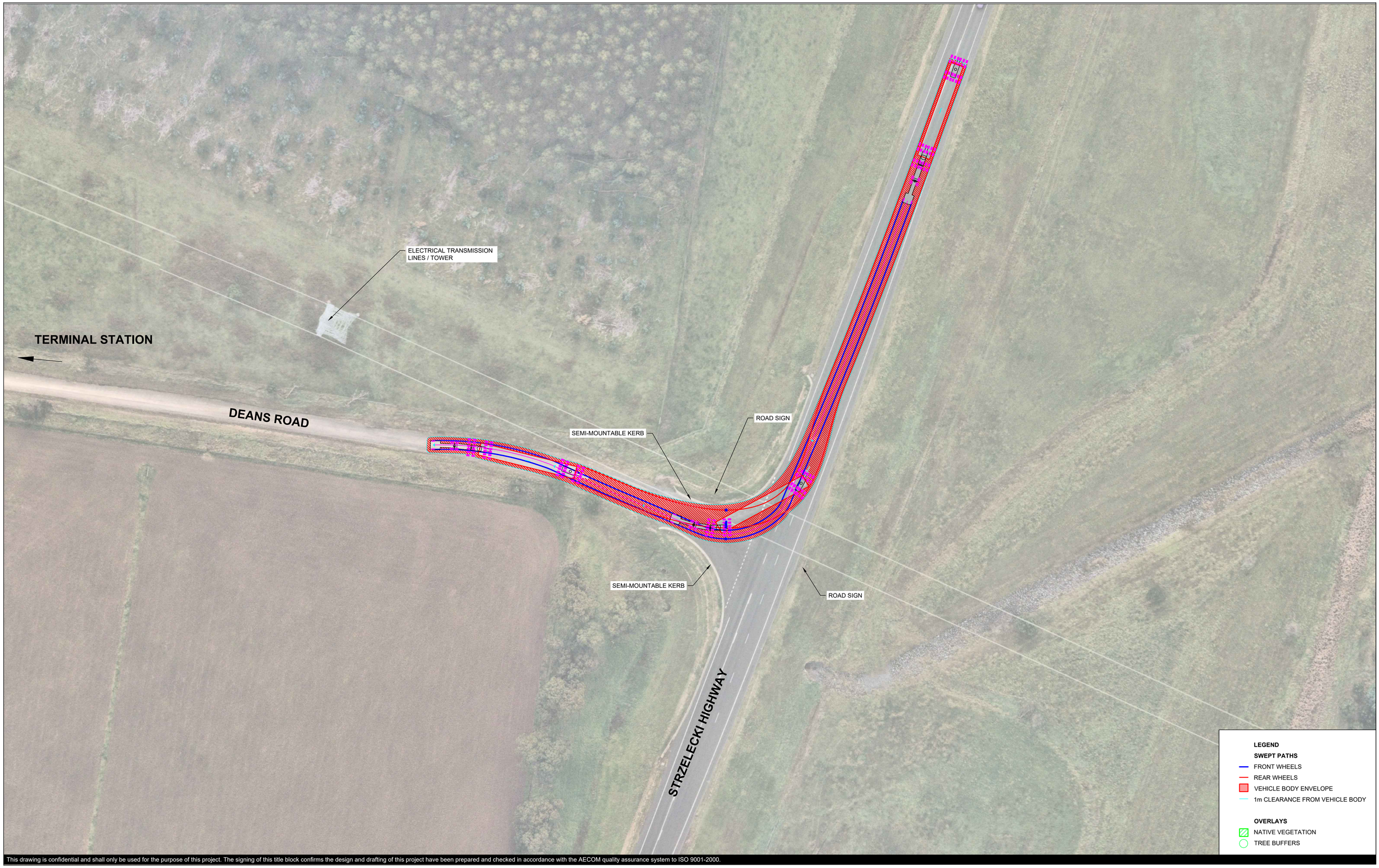
400 X 566mm A2

[A2]

Appendix C

OD vehicle swept path analysis

ISO A1 594mm x 841mm



AECOM

CONSULTANT

AECOM Australia Pty Ltd
A.B.N 20 093 846 925
www.aecom.com

PROJECT

DELBURN WIND FARM TIA

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM		SURVEY	

SCALE

0 12.5 25 m

1:500

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
STRZELECKI HIGHWAY
SMITHS ROAD
(SR)

ISO A1 594mm x 841mm

AECOM

CONSULTANT

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A.B.N 20 093 846 925
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PROJECT

DELBURN WIND FARM TIA

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM		SURVEY	

SCALE

0 12.5 25 m
1:500

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
DEANS ROAD
VARYS TRACK
(VT)