Appendix K

Delburn Wind Farm

Traffic Impact Assessment

Delburn Wind Farm

Traffic Impact Assessment

Client: Delburn Wind Farm Pty Ltd

ABN: 61 614 090 130

Prepared by

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3	14-Aug-2020	Final Issue	Trevor March Associate Director - Infrastructure Services	
4	19-Oct-2020	Updated to reflect planning application amendments	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
BBSC	Baw Baw Shire Council
BBSCRMP	Baw Baw Shire Council Road Management Plan
CH(L)/(R)	Channelised left/right turn treatments
DoT	Department of Transport
DWFPL	Delburn Wind Farm Pty Ltd
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)
SGCRMP	South Gippsland Council Road Management Plan
SGSC	South Gippsland Shire Council
SISD	Safe intersection sight distance
SRV	Small Rigid Vehicle
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
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 Wind Farm.

1.1 Project background and location

Delburn Wind Farm 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 the development with the following indicative development timeframes given 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 Wind Farm development is located on existing timber plantations (HVP Plantations' Thorpdale Tree Farm) in the south of the Latrobe Valley, which is approximately 130 kilometres east of Melbourne. The site location is shown in Figure 1.

As shown in Figure 1, Delburn Wind Farm has most of its proposed WTGs located in the Latrobe City Shire (28 WTGs), 4 WTGs in South Gippsland Shire and a single WTG in Baw Baw Shire. It should be noted that the WTGs located in South Gippsland Shire and Baw Baw Shire are accessed via local roads under the control of Latrobe City Council (LCC) or Regional Roads Victoria (part of Department of Transport) (RRV / DoT) and consequently there are no project impacts on South Gippsland Shire (SGSC) or Baw Baw Shire Council's (BBSC) respective assets.

The Delburn Wind Farm project will also require the construction of a Terminal Station along Deans Road (shown in Figure 1). Traffic impacts from the terminal station are to be detailed and addressed in a separate TIA as this will be subject to a separate planning application process.

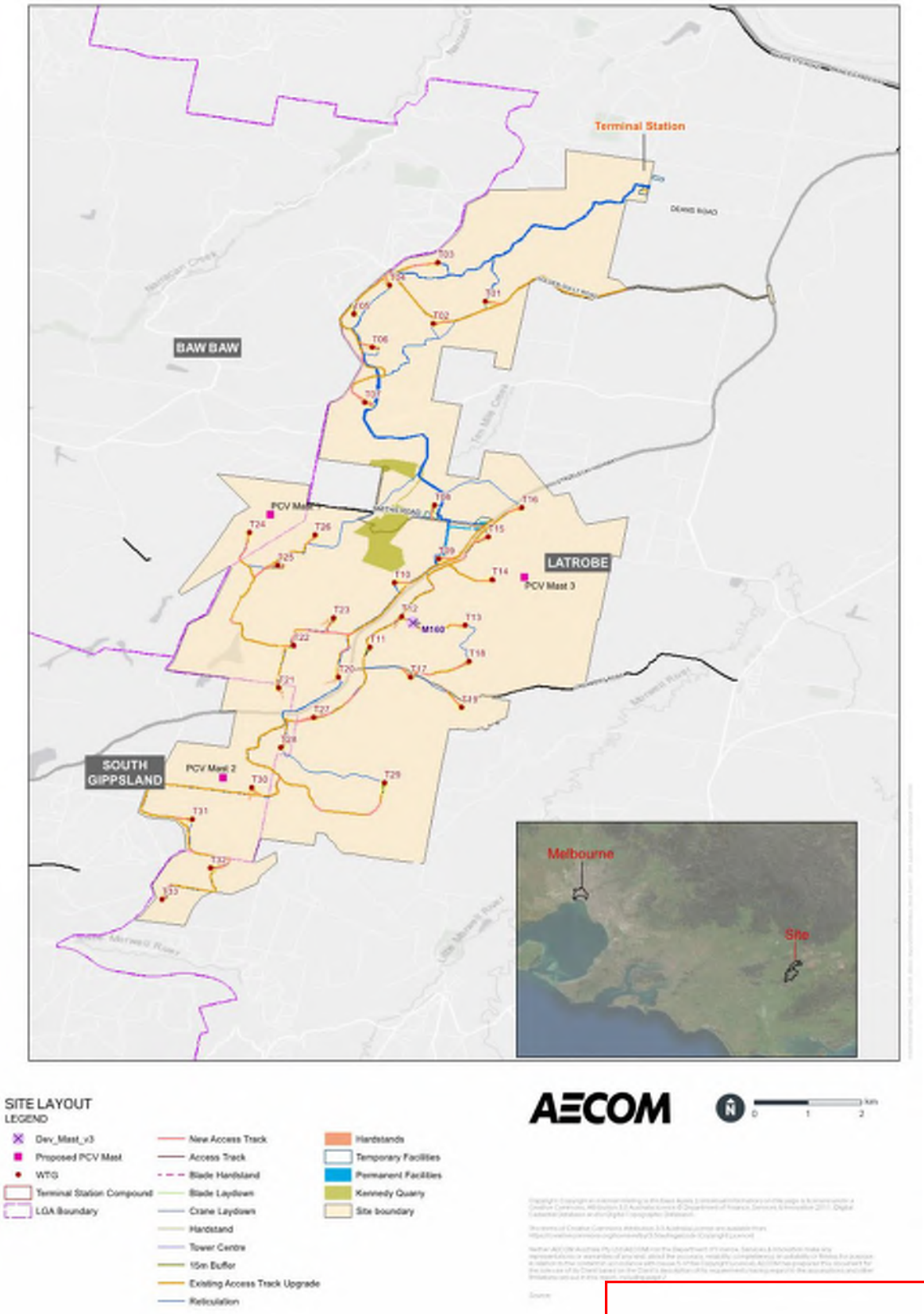


Figure 1 Delburn Wind Farm site location

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 intersections.
- Identification of construction traffic transport routes from wider ports and on local routes to Delburn Wind Farm. Worst case over-dimensional swept path assessments have been undertaken to identify access mitigation measures and subsequent native vegetation removal requirements (subject to functional and detailed design stages).
- TIA summary and next steps

1.3 Stakeholder consultation

1.3.1 TIA stakeholder kick-off meeting

A Delburn Wind Farm TIA stakeholder kick-off meeting was held via video conference on 26 March 2020 with RRV and LCC, with apologies from SGSC and BBSC. A summary of the key comments from the stakeholders and where they have been addressed in the TIA report is provided in Table 1-2.

Table 1-2 TIA stakeholder kick-off meeting - key discussion points and TIA actions

Stakeholder	Item	TIA report reference
Road access and intersections		
All	Princes Highway and Marretts Road intersection usage had no significant objections.	n/a
All	Marretts Road and Strzelecki Highway Suggested to review whether overtaking lanes are required.	See Section 8.3.2
All	Strzelecki Highway and Golden Gully Road intersection usage had no significant objections.	
LCC	<u>Golden Gully Road</u> Requested details on heaviest expected transport loads / axle loads.	See Section 5.1.3
RRV LCC	<u>Strzelecki Highway and Smiths Road intersection</u> • Tree to the north of Smiths Road is culturally significant, requires further assessment to see if can be retained. • Raised query about batching plant operations. TIA to detail estimated number of traffic movements. • Concerns with regards to construction traffic damage to Smiths Road.	See Section 7.2.1 See Section 6.0 See Section 8.0. Treatment options to be designed as part of Traffic Management Plan (TMP)

Stakeholder	Item	TIA report reference
RRV	Strzelecki Highway and Creamery Road intersection RRV is currently investigating a northbound overtaking lane on the Strzelecki Highway between Morwell and Mirboo Road. The proposed overtaking lane is located near Creamery Road. This proposal is currently in a planning phase only. Integration of any improvement works within this area should be considered in subsequent stages.	See Section 8.5
General		
RRV	Raised road safety and driver distraction concerns generated by the new turbines including flickering effects of the turbines	See Section 9.2.1
RRV	Vehicle loading and road weight limits should be considered in TIA.	See Section 5.1.3
All	Temporary pavement types for over-dimensional (OD) vehicle movements was raised, these are commonly unsealed with flexible barriers. RRV noted that gravel from unsealed pavements should be removed where it encroaches onto sealed roads after each OD vehicle movement.	
LCC	Requested indication of likely traffic volumes from the project.	See Section 6.0

1.3.2 TIA stakeholder review comments

To be detailed here once consultation completed.

1.4 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
- Laobe City Council planning scheme - clause 21.08 Transport and Infrastructure
- South Gippsland planning scheme – clause 21.09 transport
- Baw Baw 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.
- South Gippsland Council Road Management Plan
- Baw Baw Shire Council Road Management Plan
- Representatives from DWFPL, RRV, LCC, SGC and BBSC.
- Infrastructure Design Manual (2020)
- Austroads Guides to Road Design and associated VicRoads supplements

1.5 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, turbine 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 profile arise.

It is noted that this document will form an input into the Traffic Management Plan (TMP), which is to be developed to reflect the final detailed wind farm design and construction methodology once verified. Typical requirements for the TMP are outlined in Section 10.2.

2.0 Policy and Guidelines Review

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

2.1 State policy and guides

The Victorian State Governments (via the Department of Environment, Land, Water and Planning, DELWP) permit application process, policy and planning guidelines for wind energy development applications is outlined on their respective website. It also outlines relevant useful publications and references.

The Minister for Planning is the responsible authority for all new planning permit applications for renewable energy facilities that are 1 megawatt or greater and associated utility installations such as battery storage and powerlines.

Victoria Planning Provisions – 52.32 Wind Energy Facility

The purpose of VPP planning clause 52.32 is to facilitate the establishment and expansion of wind energy facilities, in appropriate locations, with minimal impact on the amenity of the area. With regards to traffic and transport the following is highlighted for consideration:

- 52.34-4 application requirements outlines as part of the design response that access road options need to be considered.
- 52.32-6 decision guidelines states that before deciding on an application, in addition to the decision guidelines of Clause 65, the responsible authority must consider several documents and guides as appropriate. The most applicable document to traffic impacts being the Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines (March 2019).

Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines (March 2019)

The Development of Wind Energy Facilities in Victoria, Policy and Planning Guidelines (March 2019) are set out to inform planning decisions and set out:

- A framework to provide a consistent and balanced approach to the assessment of wind energy projects across the state;
- A set of consistent operational performance standards to inform the assessment and operation of a wind energy facility project; and
- Guidance as to how planning permit application requirements might be met.

With regards to traffic impacts the guidance outlines the following in summary:

- In section 4.2.2 Seek Expert Advice, the document states that an application should be accompanied by an assessment considering the traffic impacts (amongst others) of the proposal, with the assessment undertaken by a suitably qualified person.
- Model planning permit conditions for wind energy facilitates are provided in Appendix B of the guidelines with reference to Traffic Management and the following to be considered as an example to local authorities:
  - Vehicle access points
  - Pre-construction public road surveys
  - Traffic Management Plan (TMP).
  - Traffic upgrade works.

The above requirements are usually all addressed as part of the TMP document and set out as a condition of planning approval. The TMP completion is usually asked to be completed in consultation with key stakeholders.

Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, Clean Energy Council, June 2018

The following guidance is given to transport impacts in the Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, June 2018 by the Clean Energy Council:

- Section 2.5.5 states that issues of traffic and transport may involve both the state and local road authorities.
- Section 3.2.1.5 Site access and transport outlines:
  - Construction requires access by over-dimensional and heavy vehicles to the site. Access to the site will need to be assessed to determine the suitability of existing public and private roads.
  - Assessment to identify upgrades or special traffic control arrangements that may be required. The relevant road authorities need to be consulted.
  - Access between turbines must be practical and therefore the route for onsite access will need to avoid steep gradients in order to cater for transportation of turbine components.
  - Transport and delivery of components from overseas will also need to be considered. Components will be delivered to nearby Port(s) and delivered to site. Port authorities should be contacted to ascertain the logistics options.
- Section 3.3.2 considers environmental considerations and associated impact assessments. The impact assessments need to identify all relevant environmental, social and economic effects associated with the proposal. The whole of the development life needs to be considered, from construction right through operation to decommissioning and rehabilitation or reuse.

  With regards to the Transport Impact Assessment the following is outlined:
  - Assessment of the type and volume (number of movements per day) of traffic associated with the construction and operation of the wind farm should be completed.
  - The assessment should include consideration of the potential impacts on the local and regional road network and any modifications to the road network that may be required (e.g. widening).
  - Assessment should be undertaken in consultation with relevant state transport department and local authority.
  - In some cases, a program of road maintenance or improvement may be agreed with the local authority to address any potential impacts cause by the movement of heavy vehicles on local roads.

With regards to the last bullet point it is considered that maintenance or improvement is usually agreed during the development of the projects TMP as more certainty of the project impacts and mitigations is known.

2.2 Local policy and management plans

2.2.1 Latrobe City Council

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 Wind Farm:

- 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 South Gippsland Shire Council

Planning scheme – Clause 21.09 Transport

Following key considerations from the Clause 21.09 Transport have been considered as part of the TIA for Delburn Wind Farm:

- 21.09-2 Objective 1:
  - To maintain a safe and efficient road network across the Shire.

Road Management Plan

The South Gippsland Council Road Management Plan (SGCRMP) delegates and delineates the public road responsibilities of Council and other stakeholders. It also aims to inform the community about their infrastructure maintenance systems and performance management review systems.

The SGCRMP states that any roadway not used by through traffic, roadsides in urban areas, service roads and median strips are the responsibility of Council. Any roads beyond these limits are under the responsibility of VicRoads but may be maintained by Council.

2.2.3 Baw Baw Shire Council

Planning scheme – Clause 21.08 Transport and Infrastructure

- 21.08-3 Objective 1:
  - To develop an appropriate multi-modal transport network that works effectively, with positive outcomes for amenity, safety and environmental values
- 21.08-4 Objective 1:
  - To support the maintenance of environmental quality by ensuring a co-ordinated approach on the location, layout, siting and timing of development and the provision of infrastructure.
- 21.08-4 Objective 2:

- To provide clear and consistent guidelines for the planning, design and construction of infrastructure.

Road management plan

The Baw Baw Shire Council Road Management Plan (BBSCRMP) acts to identify the road management responsibilities of Council and other stakeholders. It also aims to inform the community about their infrastructure maintenance systems and performance management review systems.

The BBSCRMP designates VicRoads as the coordinating road authority of the main road network and is typically the responsible authority for the entire road reserve on all Highways, Freeways and declared main roads in rural areas. Council is responsible for all other public roads.

2.2.4 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 site is located within the HVP Thorpdale tree plantation in Delburn, bordered by Narracan to the north, Yinnar to the east, Darlimurla to the south and Thorpdale to the east. Local land use is dominated by either tree plantations associated with the tree farms within and surrounding the site, or properties which maintain farmland. There is also a private quarry located within the site along Smiths Road.

The primary local roads utilised by the project are shown below in Figure 2.

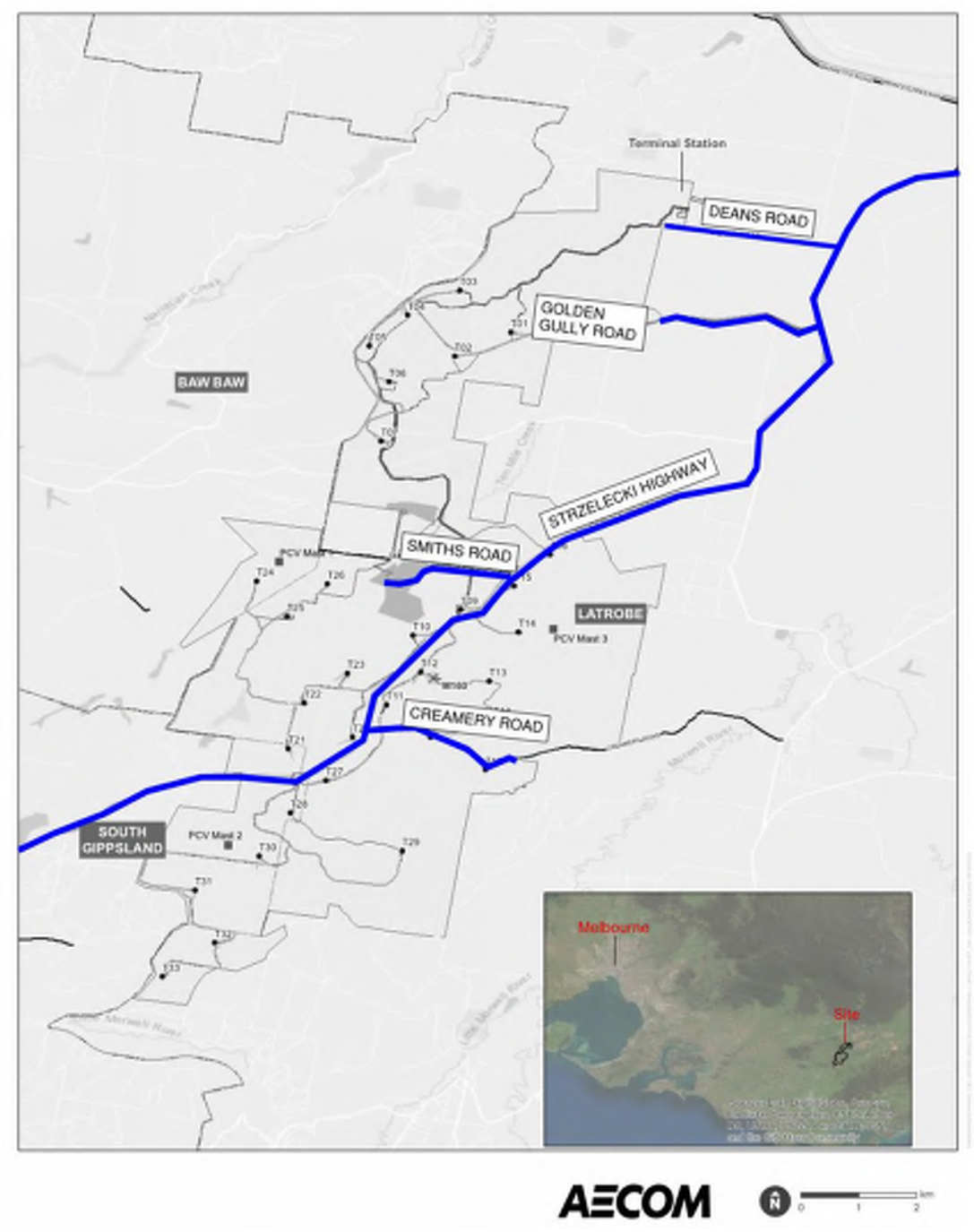


Figure 2 – Key Roads

3.2 Local road network

The following review of the local road network serving Delburn Wind Farm 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.

3.2.1 Department of Transport (VicRoads) road assets

Princes Freeway (Western Port Highway to Strzelecki Highway)

The Princes Highway (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 Highway comprises of 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 Highway is a registered roadway on Victoria's OSOM Network, and is a gazetted road for B-Doubles.

Strzelecki Highway

The Strzelecki Highway (B460) is a B-class highway which connects the Princes Highway (M1) to the local roads necessary to access the WTG sites. It is a single carriageway of one 3.5 metre wide lane in each direction and 2 metre sealed shoulders. The Strzelecki Highway provides access to Golden Gully Road, Smiths Road and Creamery Road; however, intersection upgrades may be necessary to facilitate this.

The Strzelecki Highway 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. The road is approximately 7 metres wide with no posted speed limit. 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 were observed along the length 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 Strzelecki Highway to the east and with Varys Track to the west. 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.

Deans Road is approximately 3 metre wide which 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 residential traffic with some traffic from the HVP planation. 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 east (Source: Google Streetview photo taken 04/2015)

Golden Gully Road

Golden Gully Road is a partially sealed east-west road which connects with the Strzelecki Highway (see Figure 5) to the east and with McDonalds Track to the west. The road is sealed for approximately 1 kilometre from Strzelecki Highway before becoming unsealed. The road is bound by residential properties to the east, before running through land owned by the HVP plantation on either side.

The unsealed section of Golden Gully Road varies in width and is typically 3.5 metres wide, permitting only a single vehicle to travel on the designated unsealed section of road, however there are areas of unvegetated verge where opposing vehicles may pass. Upon approach to its priority intersection with the Strzelecki Highway, the road widens to approximately 5 metres wide.

Traffic volumes through Golden Gully Road have been found to be relatively low (refer Table 3-2), which was supported by AECOM's on-site observations. It is noted that no speed signs are present and drivers must drive to the conditions of the road.

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

Smiths Road

Smiths Road is an unsealed east-west road which connects with the Strzelecki Highway to the east and with Ten Mile Creek Road to the west. A short length of Smiths Road near its priority intersection with Strzelecki Highway is sealed (see Figure 6).

Smiths Road is approximately 6 metres wide and permits two-way travel. However, the road width and vegetation on either side of the road may reduce access for two-way heavy vehicle access.

No traffic data was available for Smiths road, however 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 6 Smiths Road – priority intersection with Strzelecki Highway (Source: AECOM photo taken 19/03/2020)

Creamery Road

Creamery Road is an unsealed east-west collector road connecting with Yinnar Road to the east with Strzelecki Highway to the west. There are several adjacent properties towards the far east of

Creamery Road but these are not within the project site boundary. Creamery Road also provides access to the HVP plantation.

Creamery Road is approximately 7 metres wide and therefore able to accommodate two-way traffic. There are also unvegetated areas on either side of the road where larger vehicles can allow other vehicles to pass if required.

Traffic counts from LCC indicate that Creamery Road experiences relatively low traffic volumes (refer Table 3-2 for measured traffic volumes). It is noted that speed signs are present, and drivers are encouraged to drive to the conditions of the unsealed road.

Figure 7 Creamery Road – priority intersection with Strzelecki Highway (Source: AECOM photo taken 19/03/2020)

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 Management Authorities (RMA)	Road Category	Posted Speed Limit (km/h)	Approx. Road Width (m)	Road Surface	Comments
Princes Freeway	Department of Transport	Highway	100	7.0	Sealed	Approved route for B-Double and Higher Mass Limit vehicles.
Strzelecki Highway	Regional Roads Victoria	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	Unsealed	

Road	Road Management Authorities (RMA)	Road Category	Posted Speed Limit (km/h)	Approx. Road Width (m)	Road Surface	Comments
Golden Gully Road	Latrobe City Council	Local Access	60	4.0	Sealed / Unsealed	
Smiths Road	Latrobe City Council	Local Access	60	6.0	Unsealed	
Creamery Road	Latrobe City Council	Collector Road	60	7.0	Unsealed	

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 Wind Farm site.

3.3.2 Public transport – bus

The Department of Transport 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 per week) with buses travelling along the Strzelecki Highway, as shown in Figure 8. The Strzelecki Highway will be used by construction vehicles to and from Delburn Wind Farm, however conflicts are expected to be minimal given the frequency of bus services and no bus stops within proximity of the proposed development sites. No bus stops are located within the vicinity of the project site.

The Churchill-Boolarra (via Yinnar) bus service is also within the vicinity of the wind farm along Boolarra-Churchhill Road, however this service is not expected to be impacted by construction activity.

No public-school bus routes have been identified in proximity to the proposed construction vehicle access routes, with the nearest public-school bus services operating along Boolarra Mirboo Road to the south of the wind farm 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 wind farm.

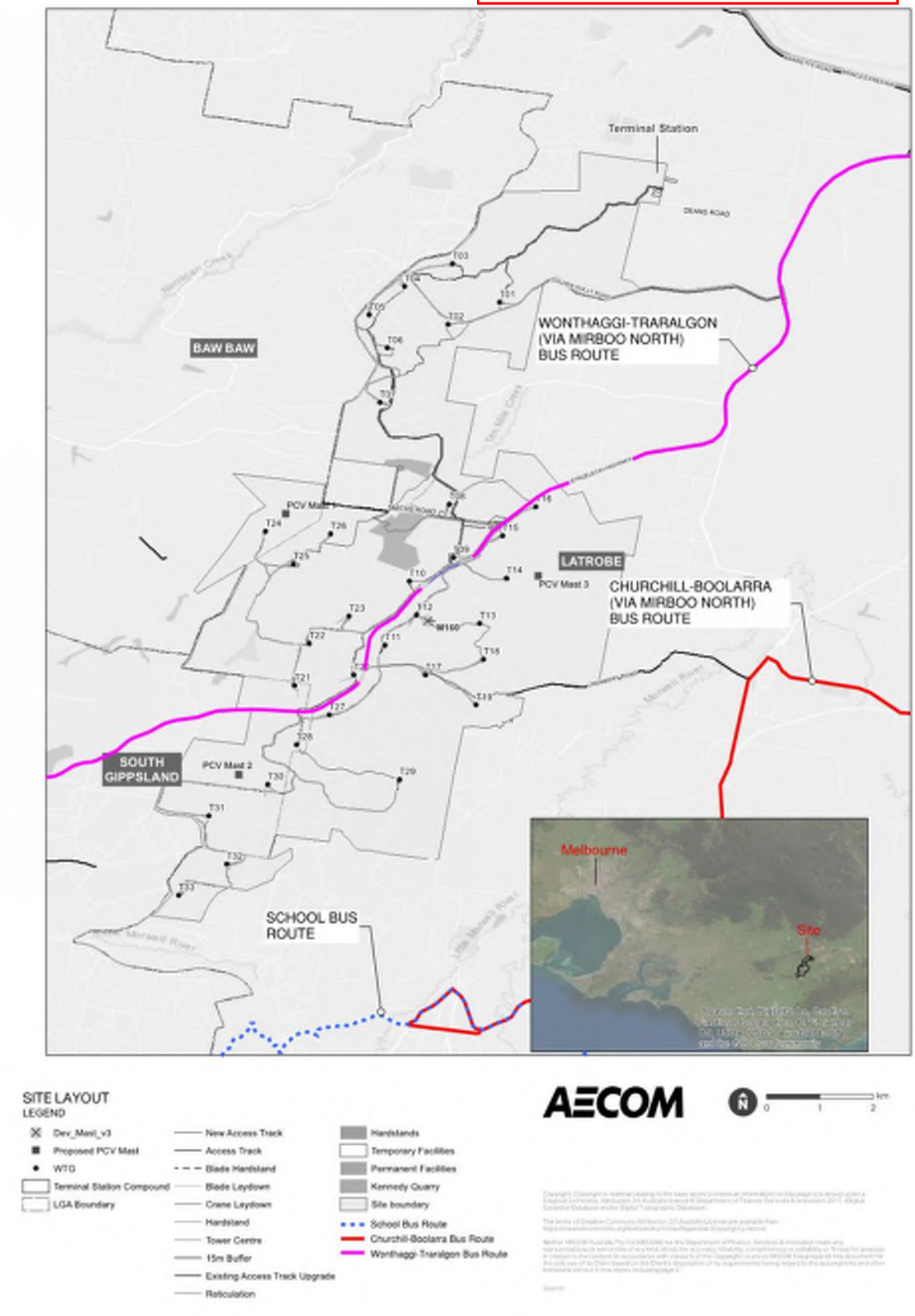


Figure 8 Local Bus Routes

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 Wind Farm have been sourced from the Department of Transport and Latrobe City Council as outlined in Table 3-2.

No AADT traffic volume data for Deans Road and Smiths Road was available from Latrobe City Council, however they are considered to be lowly trafficked roads.

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%
Strzelecki Highway Btw Morwell Thorpdale and Mirboo North Trafalgar	3,800^ (2020)	3800	380	11%
Mirboo North Trafalgar Road	990^ (2020)	990	99	11%
Morwell Thorpdale Road	620^ (2020)	620	62	5%
Marretts Road	876^ (2015)	930	93	NA
Golden Gully Road	47^ (2011)	54	6	NA
Creamery Road	360^ (2015)	383	39	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

VicRoads CrashStats was reviewed for the last 5 years of crash data for relevant roads within a 2 kilometre distance of the project site, the summary analysis outputs are provided in Appendix **A**.

A total of 81 recorded crashes were found to occur over the analysed time period. There were no key trends in reoccurring crash types at the key access intersections to Delburn Wind Farm.

4.0 Proposed Delburn Wind Farm Project

4.1 Overview

Delburn Wind Farm aims to be an iconic wind farm that will contribute to the Latrobe Valley's energy transition. Delburn Wind Farm is proposed to provide a total of 33 WTGs and generate 180 – 200 MW of electricity. The site layout is provided in Figure 9.

Wind farm 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 Delburn Wind Farm.

4.2 Stage 1 - construction

4.2.1 Timing and activities

The indicative construction program and timeframes for the Delburn Wind Farm are outlined below:

- Pre-construction works (2022) - It is estimated that early works construction period including preparatory works and site clean-up will take approximately two months from site preparation to completion. The typical construction tasks as part of the early works are outlined below:
  - Detailed site investigations
  - Temporary site compound areas
  - Access road upgrades
  - Access tracks
  - Commissioning and clean-up
- Construction works (2022 to 2023) - It is estimated that the construction period, including preparatory works and site rehabilitation will take approximately 18 to 24 months from site preparation to completion. The typical construction tasks of the wind farm are outlined below:
  - Access roads and intersection upgrades
  - Access tracks
  - Hardstands
  - Foundations
  - Wind turbine supply and erection
  - Electrical works (cabling & substation)
  - 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 Wind Farm:

- Equipment and workers transported to the project site in order to establish the site. Temporary site offices to be located via Smiths Road along 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 wind farm 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 relevant WTGs. It is noted that works on RRV assets must satisfy RRV material specifications, and it is unknown at this stage whether these can be completely sourced from the Kennedy Haulage Driffield Quarry.
- WTG component sources have yet to be verified and are subject to discussions with manufacturers and Port(s) for delivery logistics. Regardless of delivery ports, it is expected that most components will be delivered via the Princes Fwy, to the north of the site.

4.3 Stage 2 – operational

Following commission, Delburn Wind Farm is expected to operate for approximately 20-25 years. It is forecasted that up to 13 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:

- WTG replacement, which requires transport and installation activities similar to the construction stage of the project.
- Substation or transmission line maintenance or replacement.
- Generators or gearboxes replaced.

In the above events larger vehicles would require accessing the site up to over-dimensional in size. Over-dimensional deliveries will typically be coordinated to occur during off-peak times and under convoy.

4.4 Stage 3 – re-powering or de-commissioning

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

- Re-powering the Delburn Wind Farm would involve removing (similar de-commissioning activities) the existing WTG components above ground level and upgrading with newer technology WTGs and associated infrastructure.
- De-commissioning involves dismantling the WTGs 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 significantly reduced as no concrete bathing plant or materials deliveries are required.

5.0 Delburn Wind Farm Vehicle Access

5.1 Stage 1 – construction stage access

5.1.1 Construction access points

A total of 11 vehicle access points (site entrances) are proposed to the Delburn Wind Farm site via the public road network. Four of the nominated access points are considered major access points, serving two or more WTGs, while the remaining accesses serve a single WTG only.

The primary access route and site access points are shown in Figure 9. A summary of the proposed access locations is provided in Table 5-1.

Table 5-1 Construction vehicle access points

Access Point No.	Access Point	Public Road	Project Access Type	Nearest Turbine	No. Turbines Accessed
01	Golden Gully Road Main Access	Golden Gully Road	Major	04	4
02	Smiths Road Main Access	Smiths Road	Major	09	9
03	Creamery Road Main Access North (T11)	Creamery Road	Major	11	6
04	Creamery Road Main Access South (T27)	Creamery Road	Major	27	7
05	Access to T01	Golden Gully Road	Minor	01	1
06	Access to T02	Golden Gully Road	Minor	02	1
07	Access to T08	Smiths Road	Minor	08	1
08	Access to T17	Creamery Road	Minor	17	1
09	Access to T18	Creamery Road	Minor	18	1
10	Access to T19	Creamery Road	Minor	19	1
11	Access to T03	Golden Gully Road	Minor	3	1

5.1.1.1 Golden Gully Road Main Access

The Golden Gully Road Main Access is located at the intersection of Golden Gully Road and McDonalds Track, approximately 5.5 kilometres east of Strzelecki Highway. The intersection will serve as access to four WTGs. Once within the site, vehicles will access each WTG through a combination of new and upgraded internal tracks. As such, access to this section of the site will be required to be designed to cater for all vehicles up to and including ODs.

5.1.1.2 Smiths Road Main Access

Smiths Road main access is located approximately 15 metres from the intersection of Strzelecki Highway and Smiths Road. The intersection is part of an existing access to HVP plantation perimeter roads and will be used to service nine proposed WTGs.

5.1.1.3 Creamery Road Main Accesses

There are two main accesses to the site via Creamery Road, located approximately 200 metres east of the Strzelecki Highway and Creamery Road intersection. The northern access (access point 03) serves six turbines, while seven WTGs are serviced via the southern entrance (access point 04). These accesses primarily use the existing access track network; however upgrades of the access tracks are expected to be required to enable access by WTG construction traffic.

5.1.2 Construction access routes

Externally sourced materials / components

It is noted that the primary delivery port for wind turbine components and materials has not yet been confirmed, however regardless of delivery port, externally sourced materials including WTG components are expected to be delivered to the site from the north – via Princes Freeway, Marretts Road and Strzelecki Highway, before turning off at the key local intersections of:

- Deans Road (substation construction only)
- Golden Gully Road
- Smiths Road
- Creamery Road

High level route analysis from potential Ports is discussed in Section 7.0.

Internally sourced materials and worker traffic

At this planning stage it has been assumed, based on advice from DWPL, that the wind farm 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 relevant WTGs. Workers are expected to access the site from all directions.

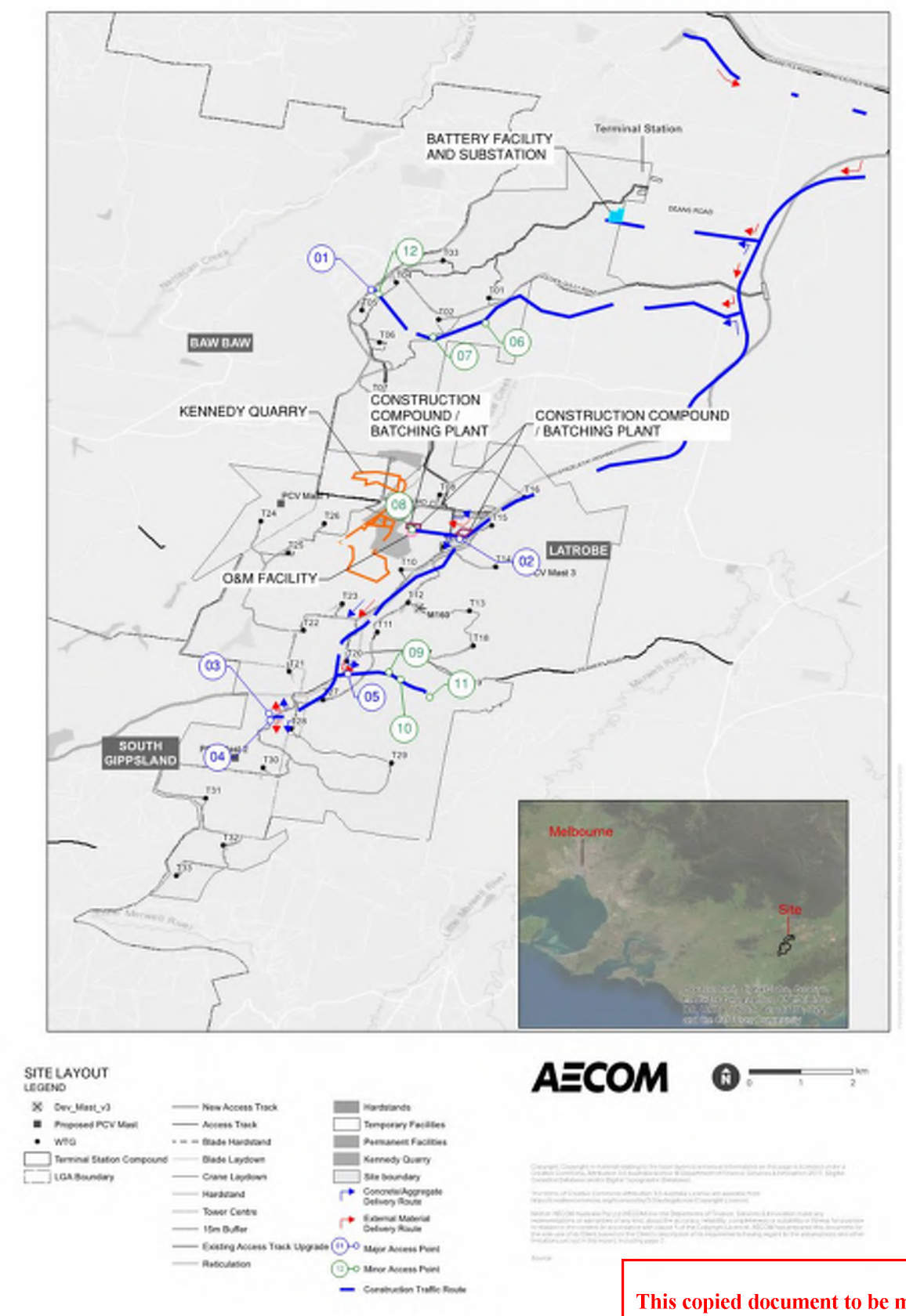


Figure 9 Delburn Wind Farm Local Delivery Route and Site Access Points

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 5-2.

Table 5-2 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
OD*	Heavy vehicles	Over-Dimensional – WTG Blades	95.0	Road Legal Mass
		Over-Dimensional – Tower Sections	55.0	
		Over-Dimensional – Generator	TBC	
		Over-Dimensional – Main transformer	TBC	

**OD vehicle dimensions and weights will be subject to final WTG 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 Smiths Road with car parking provided for the anticipated permanent staff.

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

Access requirements for repowering or decommissioning 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 Wind Farm project, the estimates are likely to change once a nominated contractor is commissioned later in the project process and a subsequent Traffic Management Plan is developed.

Traffic generation estimates were made based on material quantities provided by DWFPL and assumptions made by AECOM which are provided in Appendix B, along with the detailed traffic generation calculations and traffic flow diagrams. A summary of the construction traffic generation over the project lifecycle by task is provided in Figure 10.

The volumes used throughout this TIA report have been conservatively estimated for each activity, in consultation with a construction contractor, 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.

It is noted that while terminal station construction works are addressed in a separate TIA, traffic from Terminal Station works has been assumed to occur simultaneously and has been incorporated into the estimated construction volumes detailed in this TIA report to ensure a robust assessment. Should there be no overlap in construction activities once programming has been finalised, the estimated construction traffic volumes are likely to reduce.

Tasks		Construction Phase (Months)																		Vehicle Trips
Task - Calculated	**Duration**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Total**
Site Establishment	1	50																		50
Public Private Road Upgrades	3		423	423	423															1268
Site Access Upgrades	6		1098	1098	1098	1098	1098	1098												6584
Hardstand Construction	6		539	539	539	539	539	539												3230
Concrete Batching	6		780	780	780	780	780	780												4680
Turbine Foundation Excavation	4.5		794	794	794	794	397													3572
Turbine Foundation Construction	1.5		4320	2160																6480
Electrical Infrastructure	10		1384	1384	1384	1384	1384	1384	1384	1384	1384	1384								13834
Component Delivery	6		506	506	506	506	506	506												3036
Turbine Erection	10							330	330	330	330	330	330	330	330	330	330			3300
Site Clean Up	2																	50	50	100
Task - Other																				
Dust Supression	17		800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	13600
Construction workforce commute	18	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	54000
Estimated Monthly Total		3050	13644	11484	9324	8901	8504	8437	5514	5514	5514	5514	4130	4130	4130	4130	4130	3850	3850	
Estimated Daily Total		153	683	575	467	446	426	422	276	276	276	276	207	207	207	207	207	193	193	

Figure 10 Project construction traffic generation estimates by task

6.1.1.1 External traffic generation

An estimate of the total external construction related vehicles to and from the Delburn Wind Farm site is provided in Table 6-1 by vehicle type and origin. This includes vehicle generation associated with the delivery of WTG and crane parts as well as any externally sourced material.

Table 6-1 Estimate of external traffic generation during construction of Delburn Wind Farm

Vehicle Type	One-way trips	Origin	Comments / Assumptions
OD Trailer	726	Port of Hastings	WTG parts etc.
Truck and Dog Trailer	11,782	Princes Freeway	Cement, concrete sand and cable bedding sand delivery
Rigid trucks	14,272	Princes Freeway	Water delivery for dust suppression and concrete batching
Other Heavy Vehicles	6,336	Princes Freeway	Support vehicles required for WTG erection, cable laying and parts delivery
Light vehicle	54,000	Princes Highway/ Mirboo–North Trafalgar Road	Workforce
Total OD vehicle trips	**726**		
Total heavy vehicle trips	**32,390**		
Total light vehicle trips	**54,000**		

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 required Delburn Wind Farm locations. This includes vehicle generation associated with the delivery of aggregate materials from the on-site quarry and concrete produced from the batch plant.

Two temporary batch plants are expected to be located along Smiths Road. They will produce concrete for the WTG footings and the substation footings.

A foundation will need to be poured in a single day. A concrete agitator can carry up to 7m^3 of concrete, resulting in an estimated that 115 one-way vehicle trips for each respective WTG foundation pour will be required. It is expected that at most, each WTG foundation pour will consist of 17 one-way trips per hour, over an approximate 7 hour working day time period.

Traffic originating from the batching plants will travel via the Strzelecki Highway and Smiths Road priority intersection and onwards to the relevant WTGs.

An estimate of the total internal vehicles to and from the Delburn Wind Farm WTG sites is provided in Table 6-2 by vehicle type and origin.

Table 6-2 Estimate of external traffic generation during construction of Delburn Wind Farm

Vehicle Type	One-way trips	Origin	Comments
Concrete agitator	6,480	Batch plants on site via Smiths Road	WTG foundations, power pole footings, substation foundation
Truck and Dog Trailer	19,984	Quarry on site via Smiths Road	Aggregate, gravel delivery
Total heavy vehicle trips	**26,464**		

6.1.2 Stage 2 - operational stage

The ongoing operation of Delburn Wind Farm would be monitored by staff onsite. It is estimated that approximately 13 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 Farm site on a daily 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 (waste removal).

Major works are not usually required in the first 5 years of wind farm operations, however in the event of major works being required then an OD vehicle delivery maybe required, for example a blade repair may require a crane delivery.

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 years from opening), an updated impact and traffic management assessments 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 balance of plant 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 foundation pours 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 75 full time equivalent workers. As such, workforce commute is expected to generate up to 75 light vehicle trips within the AM peak. It is estimated that 60% of the workforce is expected to arrive along Strzelecki Highway from the north, while the remaining 40% is expected to arrive along Strzelecki Highway 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.

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 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 11.

Adopting a conservative scenario where vehicles are predicted to both arrive and depart from a site during the AM 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 11. It is noted that for short periods

corresponding with the pouring of foundations, peak traffic volumes at intersections may increase by up to 17 vehicles per hour. Foundation pours are expected to last one day per WTG, meaning the maximum period of increased traffic for each intersection will scale based on the number of WTGs served. For example, the Smiths Road Main Intersection serves nine WTGs, and is therefore expected to have nine days in which peak traffic will increase over the life of the project.

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	2
Strzelecki Hwy - Golden Gully Road	480	538	5	4
Strzelecki Hwy - Smiths Road	380	424	30	52
Strzelecki Hwy - Creamery Road	380	410	14	0

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

** *Includes existing traffic volumes, 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.*

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 13 staff vehicles per day will commute to and from the site each day. These are expected during the AM 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 wind farms lifecycle (approximately 25 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.

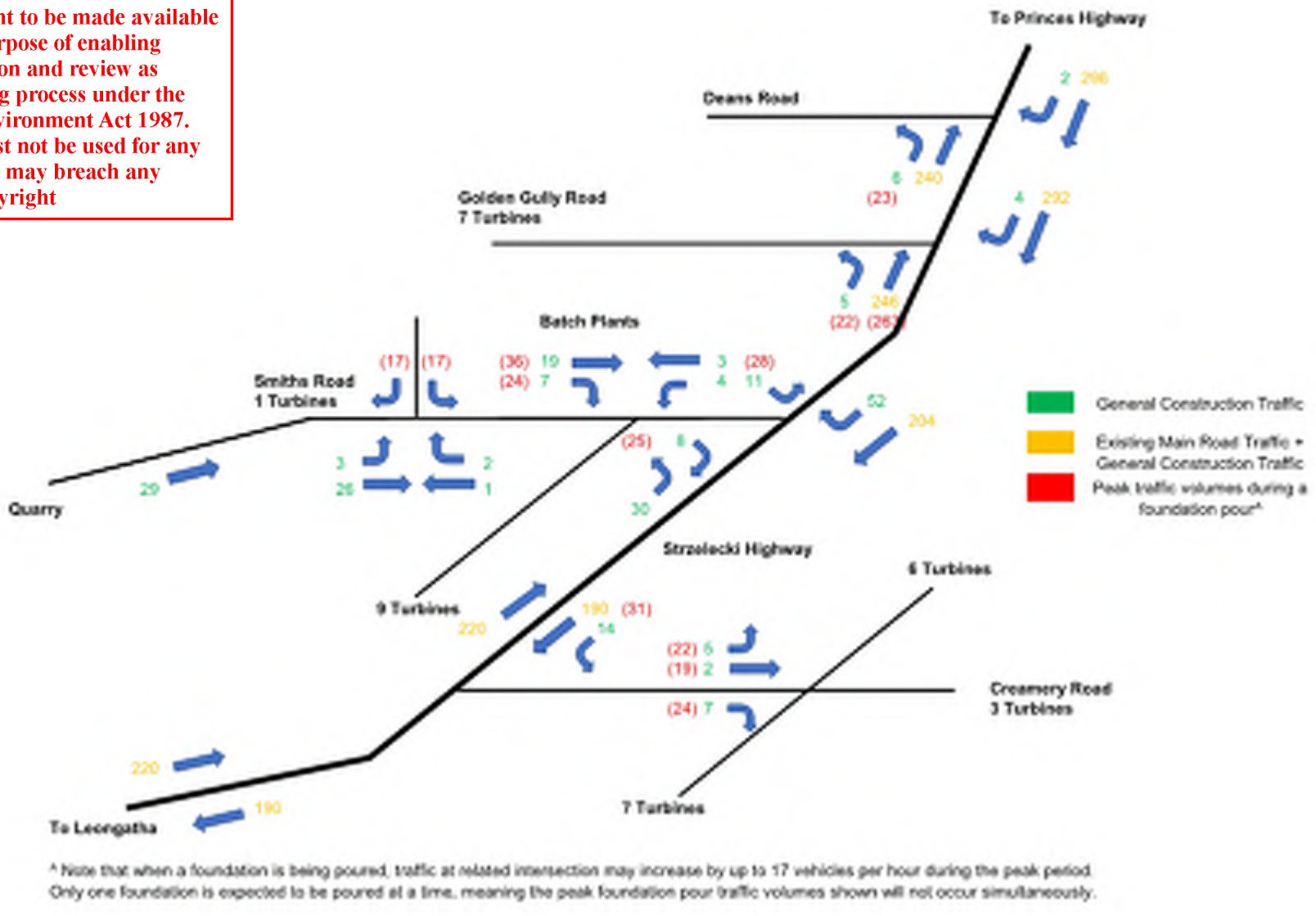


Figure 11 AM Peak Traffic Flow Diagram estimated during the construction period

7.0 Preliminary Construction Traffic Route Assessments

7.1 Potential OD transport routes – port assessment

At this stage the delivery port for materials and WTG components has not been selected. It has been noted that previous assessments for the project had adopted the Port of Hastings as the nominated port for large component deliveries to Delburn Wind Farm, however this needs to be further investigated given the required accessibility and storage requirements for the proposed WTGs as part of this project. 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 Traffic Management Plan(s) and approvals gained for the project.

Accordingly, 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 WTG components. The routes associated with each have been summarised in terms of initially identified major constraints for any over-dimensional (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 Department of Transport (VicRoads) height and weight restrictions (noting a more holistic review will be required and undertaken by the relevant transport contracotr, 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 Delburn Wind Farm will be the same from all port options. A summary of the port route options is shown in Figure 12 and discussed further in the subsequent report subsections.

It is noted that all works outside of the wind energy facility boundary, shown in Figure 1, including those associated with OD delivery, will form part of a separate permit application(s) including any other downstream road modification works and/or native vegetation removal works associated with the delivery from port of choice and are not addressed in applications accompanying this TIA.

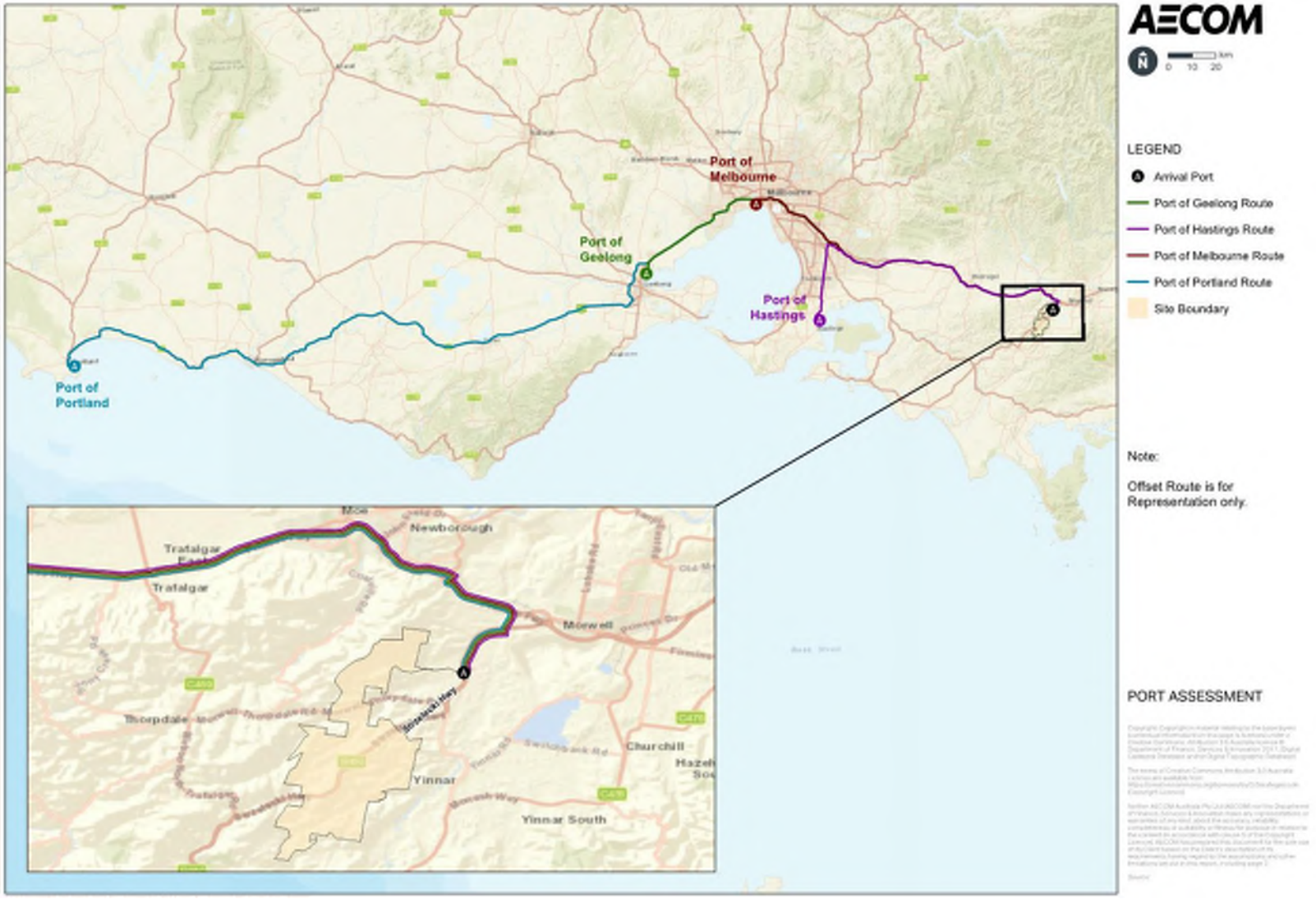


Figure 12 Potential OD transportation options from assessed ports

7.1.1 Port of Hastings

Potential OD transport route – Option 1

Vehicles depart Port of Hastings Western Port (Bluescope Steel berths) travelling on its internal road network before exiting onto Frankston-Flinders Road (C777). Vehicles will continue on Frankston-Flinders road and turn onto Western Port Highway (A780). Vehicles will follow the A780 until it transitions to the M780, then turn right onto Princes Highway (Alt 1), before finally turning right onto the Princes Fwy (M1) and continuing onwards to the site.

The following key constraints have been identified with this potential OD transport route:

- Port of Hastings Western Port is privately operated by Bluescope Steel Corporation and will require approval from Bluescope. Port will require modifications to internal road network to accommodate delivery and internal movements of 90 metre blades between the berths and Frankston-Flinders Road.
- Height restriction of 5.1 metres along M1 at multiple locations between Moe and Morwell.
- Height restriction of 5.2 metres along South Gippsland Freeway at multiple locations near Hampton Park.
- Modifications will be required to most roundabouts along the A780 / M780.

Potential OD transport route – Option 2

OD/OSOM vehicles that do not satisfy the 5.1 metre height restriction along the M1 between Moe and Morwell could exit via the Princes Highway (M1) at Trafalgar onto the Mirboo North-Trafalgar Road and continue to the site location from there.

OD/OSOM vehicles that do not satisfy the 5.2 metre height restriction along the South Gippsland Freeway near Hampton Park could commence their journey as detailed in the preferred route but make a right turn at Thompsons Road when travelling northbound via the Western Port Highway. After travelling eastbound along Thompsons Road, vehicles can make a left turn at Clyde Road until reaching and merging onto the M1.

Where vehicles are a combination of over 3 metres wide or 26 metres long, permission from DEDJTR must be acquired to travel along the preferred route. If permission cannot be acquired, a special route will have to be considered.

7.1.2 Port of Melbourne

Potential OD transport route – Option 1

Vehicles depart Port of Melbourne via Webb Dock Drive onto Cook Street before merging onto the West Gate Freeway (M1) and continuing from there to the site location.

The following key constraints have been identified with this potential OD transport route:

- Weight restriction of 49.5 tonnes along M1 between Port Melbourne and Docklands.
- Height restriction of 4.65 metres along M1 between South Wharf and Chadstone.
- Approval required by Port of Melbourne to use Webb Dock Drive.
- Written clearance required by Citilink along Southern Link Tollway (M1).

Potential OD transport route – Option 2

Overmass vehicles which do not satisfy the 49.5 tonne weight restriction may apply for a bridge assessment permit.

OD/OSOM vehicles which do not satisfy either the 4.65 metre height restriction or the 49.5 tonne weight restriction and fail to acquire a permit could commence their journey via Webb Dock Drive onto Williamstown Road before turning right at Ingles Street. OD vehicles may then continue southbound before turning right again onto Pickles Street. Where Pickles Street ends, vehicles will then travel southbound along Beaconsfield Parade (Route 33) until South Road (Route 14) is reached. OD vehicles will then take South Road onto the Dingley Bypass and continue along the bypass until it

reaches Westall Road. They will the continue south along Westall Road and Dandenong Bypass (Route 49) until South Gippsland Highway. A short journey north along South Gippsland Highway will allow vehicles to turn eastbound onto the Princes Highway (Alt 1) where vehicles can then take Belgrave Hallam Road to merge onto the Monash Freeway (M1). From there, the M1 can be taken to the site location. This is a preferred OD route according to VicRoads OD Route Network and is a registered OSOM route. OSOM curfews apply along part of this route from 9am to 4pm Monday to Saturday and 6am Saturday to 6am Monday. The new overheard restriction of this alternate route is 5.2 metres. Vehicles that are longer than 26m are restricted from using this route due to a restricted level crossing.

Where written clearance from Citilink to use the Burnley Tunnel cannot be acquired, the alternate route detailed above should be employed.

Where vehicles are greater than 4.65 metres in height and longer than 26 metres, a special alternate route will have to be considered or arrangements with appropriate authorities (VicRoads) will have to be made.

7.1.3 Port of Geelong

Potential OD transport route – Option 1

Vehicles depart the Port of Geelong via The Esplanade and Madden Avenue onto Seabeach Parade (C115) northbound. From there, they continue along Seabeach Parade before merging onto the Princes Freeway (M1) citybound and continuing to the site location.

The following key constraints have been identified with this potential OD transport route:

- Weight restriction of 49.5 tonnes along M1 between Port Melbourne and Docklands.
- Height restriction of 4.65 metres along M1 between South Wharf and Chadstone.
- Height restriction of 4.8 metres along M1 between Little River and Werribee.
- Approval required by Port of Melbourne to use Webb Dock Drive.
- Written clearance required by Citylink along Southern Link Tollway (M1).

Potential OD transport route – Option 2

Overmass vehicles which do not satisfy the 49.5 tonne weight restriction may apply for a bridge assessment permit.

Overmass vehicles which do not satisfy the 49.5 tonne weight restriction and fail to acquire a permit could commence their journey as per the preferred route until merging onto the M1. From there, instead of continuing to the site location, vehicles will take the exit onto the Western Ring Road (M80) northbound near Laverton East. OD vehicles could continue along the M80 until Greensborough Road (Route 46) where they will make a right turn and travel southbound. Where the Greensborough Road ends, vehicles turn right onto Lower Plenty Road and then left onto Rosanna Road.

From Rosanna Road, vehicles then continue south and turn left onto Bridge Street (Route 40) before making a right onto Bulleen Road (Route 52). Vehicles could then merge onto the Eastern Freeway (M3) eastbound towards Doncaster and exit southbound at Springvale Road (Route 40). After travelling along Springvale Road, vehicles could turn left onto Burwood Highway (Route 26) and merge onto Eastlink (M3). From there, vehicles can merge onto the Monash Freeway (M1) and continue to the site location. It is noted that trucks in excess of 16.5 tonnes are restricted along this route from 10pm to 6am.

OD/OS vehicles which do not satisfy the 4.65 metre height restriction and are greater than 26 metres in length are able to follow the alternate route detailed above. The new height restriction following this alternate route is 4.8 metres. Otherwise, vehicles which are smaller than 26 metres in length are also able to continue along the M1 before exiting at Montague Street southbound near South Melbourne before turning right at Normanby Road and left onto Ingles Street, then following the alternate route described in 7.1.2. Although the new height restriction following this alternate route is 5.2 metres, vehicles greater than 4.8 metres in height are recommended to not travel from the Port of Geelong as the 4.8 metre height restriction along the M1 between Little River and Werribee present complications.

Where written clearance from Citylink to use the Burnley Tunnel cannot be acquired, the alternate route detailed in Section 7.1.2 must be employed for vehicles longer than 26 metres and the alternate route detailed in this section shall be adopted for vehicles less than 26 metres in length.

7.1.4 Port of Portland

Potential OD transport route

Vehicles depart from the Port of Portland and follow the Henty Highway (A200) until it intersects with the Princes Highway (A1) just north of Dutton Way / Portland North. Vehicles could then turn right to head in an easterly direction along the Princes Highway towards Melbourne and continue to the site location.

It is noted that the Port of Portland has been used previously for wind farm deliveries, including Murra Warra Wind Farm, with components being stored at the Rex J Andrews laydown at 211 Portland Nelson Road. Road upgrades would likely be required to facilitate delivery of the larger WTGs that are being used at Delburn Wind Farm

The following key constraints have been identified with this potential OD transport route:

- Height restrictions of 5.4m at Bridgewater Road. This may be avoided by routing tall vehicles around Portland via Madeira Packett Road and Malings Road. However, it is understood the Glenelg City Council have previously raised objections to tall component delivery vehicles utilising this route due to the proximity of residents to these roads. Stakeholder engagement with DoT and Glenelg City council are recommended should this route be further considered.
- Weight restriction of 49.5 tonnes along M1 between Port Melbourne and Docklands.
- Height restriction of 4.65 metres along M1 between South Wharf and Chadstone.
- Height restriction of 4.8 metres along M1 between Little River and Werribee.
- Approval required by Port of Melbourne to use Webb Dock Drive.

7.2 Written clearance required by Citilink along Southern Link Tollway (M1).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 to the proposed site access points. 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 component 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 an in-bound blade 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 entering blade delivery vehicle, as many of the over-dimensional delivery vehicles will have a reduced foot-print once components have been offloaded and trailers are retracted. It is noted that should fully loaded blade delivery vehicles be required to travel in the out-bound direction, such as in the case of blade replacement, additional OD swept path impacts may result. Mitigation measures associated with out-bound OD vehicles has not been investigated within this report, and would need to be considered should removal or replacement of OD components be required.
- Following initial swept path analysis, a site visit was undertaken to identify any additional local features and constraints that were not clear in the aerial imagery. The site visit was also used to determine any other constrained areas where further swept path analysis was required.
- 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 Delburn Wind Farm will be the OD blade delivery vehicles, with three blades to be delivered to each WTG site. It is noted that the WTG model has not yet been confirmed, although it is expected to be up to approximately 88 metres in length.

AECOM have developed a custom OD blade delivery vehicle based on information given in the technical specifications of a potential turbine supplier as provided by DWFPL, with dimensions shown in Figure 13. The OD blade delivery vehicle has been modelled with active rear-wheel steering.

A minimum turning radius adopted for the design vehicle was varied between 15 metres and 40 metres depending on the turning angle, in accordance with the supplier specification.

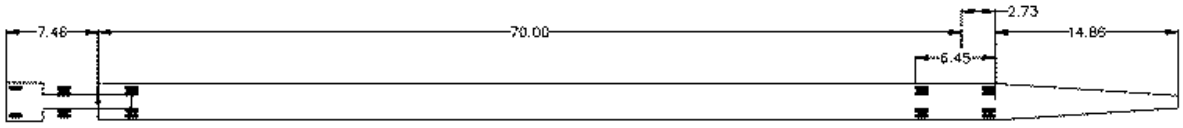


Figure 13 Modelled OD blade delivery vehicle

7.2.3 Identified horizontal pinch points

Following the OD blade delivery vehicle swept path analysis, a total of 11 pinch points (either relating to potential existing pavement or native vegetation constraints) have been identified along the delivery route between the Princes Freeway and the site access points. Swept path analysis was not undertaken prior to Princes Freeway, as the delivery Port has not yet been selected.

It is noted that modifications to the road and access tracks will be required at each of the nominated site access points to accommodate OD construction vehicles. A swept path has been developed for access point 08 (Smiths Road to T08), which is considered representative of the impact OD vehicles may have at access points. Swept path analysis has not been undertaken for all other access points, as the impact extents and mitigation measures are predicted to be similar to access point 07 (pinch point SR2). Intersection design for all access points shall be undertaken in subsequent design phases, when topographical information is available to ensure all access mitigation measures are accounted for.

Pinch points at the turn-off from Princes Freeway to Marretts Road (PF), and from Marretts Road to Strzelecki Highway (MR), have been included in this TIA for information, however it is noted that these are outside the wind energy facility boundary (shown in Figure 1). These pinch points may be subject to further design refinement and will be addressed separately in future permitting applications.

The vehicle swept paths for each pinch point have been attached in Appendix C, with a summary of the constraints identified shown on Figure 14 and detailed in Table 7-1.

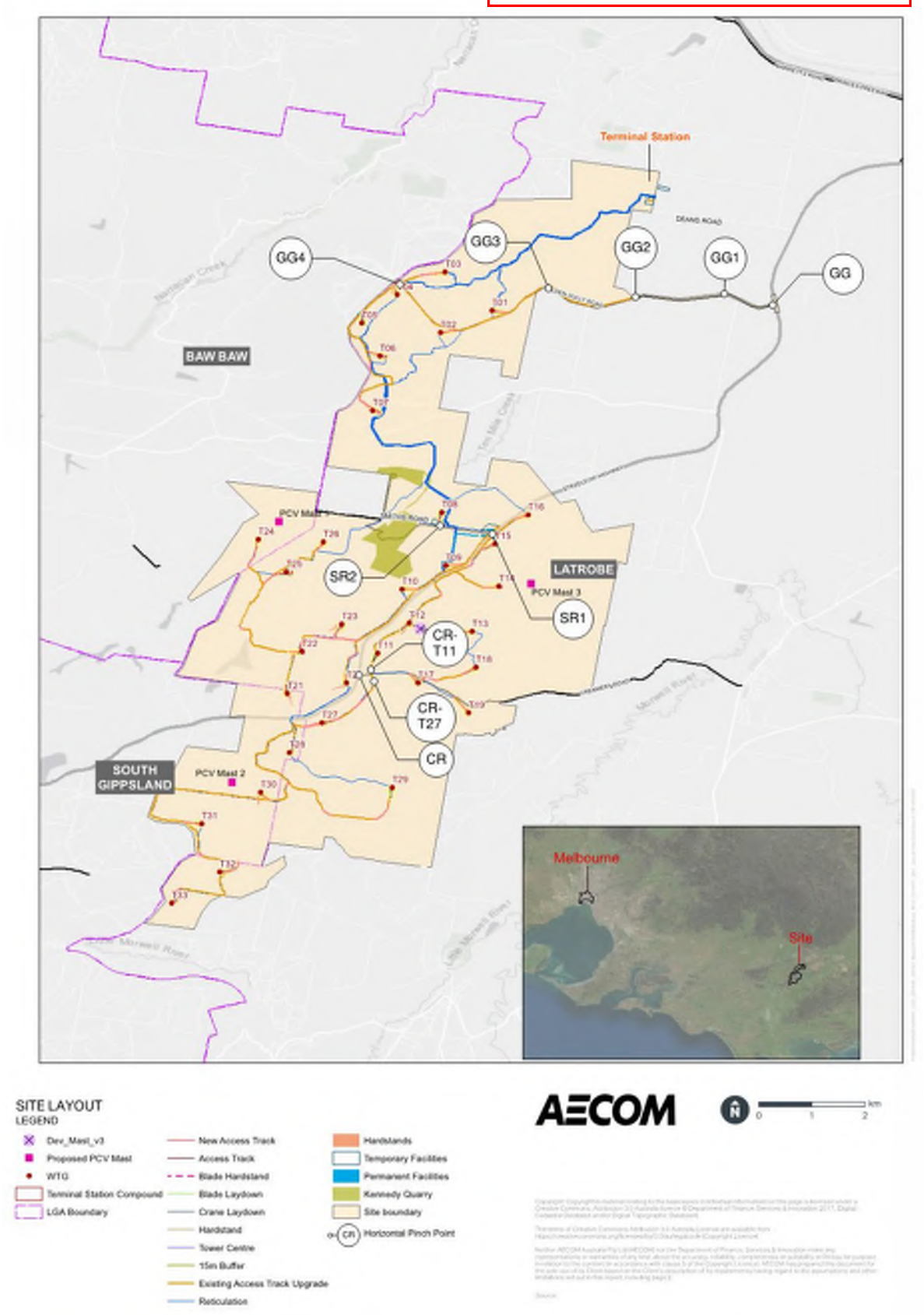


Figure 14 Horizontal Pinch Points for Blade Delivery Vehicles

Table 7-1 Swept path analysis – preliminary identified conflicts summary (refer Appendix C for swept paths at each identified pinch point)

Pinch Point	Location	Preliminary Identified Conflicts
PF	Princes Freeway – Marretts Road Intersection	- Vegetation, mostly shrubs and small trees (north-west and south-west of intersection) - W-Beam road safety barriers (north-west and south-west of intersection) - Grassed median area - Two road Signs
MR	Marretts Road – Strzelecki Highway Intersection	- Raised central median (semi-mountable) - Three road signs - 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 .
GG	Strzelecki Highway – Golden Gully Road Intersection	- Road shoulder, verge and grassed open channel drain (east and north-west of intersection) - One road sign - small patches of native vegetation - existing culvert and roadside drainage (north and south of intersection)
GG1	Golden Gully Road internal turn	Road width is 3.5 metres, design vehicle sweeps into shoulder and through native vegetation on both sides of the road.
GG2	Golden Gully Road internal turn	Road width is 3.5 metres, design vehicle sweeps into shoulder and through native vegetation on both sides of the road.
GG3	Golden Gully Road Internal Turn	Road width is 3.5 metres, design vehicle sweeps into shoulder and through native vegetation on both sides of the road. Electricity transmission lines are located on the northern side of Golden Gully Road, however these lines appear to be outside of the swept paths.
GG4	Golden Gully Road – McDonalds Track Intersection	-Large patches of native vegetation on east and west sides of Golden Gully Road
SR	Strzelecki Highway – Smiths Road Intersection	- Patches of native vegetation to the east of Strzelecki Highway - One road sign - small patch of native vegetation on Smiths Road Note that a significant tree is located on the north-west corner of the intersection. Swept paths have been adjusted to avoid this tree.
SR2	Smiths Road to T12 intersection	- Native vegetation
CR	Strzelecki Highway – Creamery Road Intersection	- Large patch of native vegetation west of Strzelecki Highway (grass and trees) - Large patch of native vegetation north-east of Strzelecki Highway (predominantly grass) - One road sign - Roadside swale

Pinch Point	Location	Preliminary Identified Conflicts
		It is noted that regional roads Victoria have proposed widening and safety barrier treatments along Strzelecki Highway at this intersection in the future – including a dedicated right turn lane into Creamery road for north-bound traffic. The swept path will clash with proposed flexible safety barriers to the west and north east of the intersection.
CR-T11	Creamery Road Main Access North (T11)	- Native vegetation to south of Creamery Road - Existing plantation vegetation
CR-T27	Creamery Road Main Access South (T27)	- Native vegetation to south of Creamery Road - Existing plantation vegetation

7.3 Height Restriction Analysis

A preliminary assessment of the existing height restrictions along the proposed OD transport route has also been undertaken due to the potential for conflict between overhead obstacles and WTG components being delivered along the route.

The mounting height of the tower sections 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. As such, overhead obstacles less than 5.5 metres above the road were noted as potential conflicts.

The desktop assessment undertaken has identified a total of seven potential conflict points in relation to vertical clearances. These locations were confirmed by AECOM during site visits. A summary of the identified vertical clearance conflict locations is provided in Table 7-2. It is noted that no survey of powerlines was available at the time of this assessment.

Table 7-2 Preferred Route Potential Overhead Obstacles

ID	Location	Description	Height (metres)
H1	Princes Highway at Princes Way	Princes Way Overpass	5.16
H2	Princes Highway at Darnum Shady Creek Road	Darnum Shady Creek Overpass	5.4
H3	Princes Highway at Old Gippstown Drive	Old Gippstown Drive Overpass	5.2
H4	Princes Highway at Fowler Street	Fowler Street Overpass	5.1
H5	Princes Highway at Coalville Road	Coalville Road Overpass	5.19

8.0 Mitigation Measures

A total of 11 access points are proposed to the Delburn Wind Farm WTG site locations which will provide access and egress for all vehicles required during the project.

8.1 Site access point upgrades

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. 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 to all WTGs
- 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 location of access point numbers can be found in Figure 9.

Table 8-1 Construction vehicle site access point requirements

Access Point No.	Design Vehicle			
	Left-in	Left-out	Right-in	Right-out
01	OD	NA	NA	OD(S) + AV
02	OD	12.5m HRV +AV	12.5 m HRV + AV	OD(S) + AV
03	OD	AV	AV	OD(S) + AV
04	AV	OD(S) + AV	OD	AV
05	AV	OD(S) + AV	OD	Light Vehicle
06	AV	AV	OD	OD(S) + AV
07	OD	AV	AV	OD(S) + AV
08	AV	OD(S) + AV	OD	AV
09	AV	OD(S) + AV	OD	AV
10	AV	OD(S) + AV	OD	AV
11	NA	OD(S) + AV	OD	NA
Batching Plants	12.5 metre HRV	12.5m HRV	12.5m HRV	12.5m HRV

8.2 Over-dimensional upgrades to public intersections

The critical turning movements along the OD route between Princes Freeway and the site access points occur at the intersections between Strzelecki Highway and public roads, 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 each intersection 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.

As detailed previously, the pinch points PF and MR are to be addressed separately in future permitting applications as they are outside of the wind energy facility project boundary and may be subject to further design refinement based on final equipment selection. Possible mitigation measures for these pinch points have been provided in Table 8-2 for information and completeness however, will be dealt with separately.

Table 8-2 Identified intersection mitigation measures

Pinch Point	Intersection	Location	Mitigation
PF	Princes Freeway – Marretts Road Intersection	North of Intersection	W-beam road safety barriers to be temporarily removed Vegetation to be removed within blade swept path Temporary pavement to be constructed along OD wheel-path
		Splitter Island	Road Signs to be made removeable Temporary pavement to be constructed along OD wheel-path
		South-west of intersection	W-beam road safety barriers to be temporarily removed Vegetation to be removed within blade swept path Temporary pavement to be constructed along OD wheel-path Road signs to be made removeable
MR	Marretts Road – Strzelecki Highway Intersection	Splitter Island	Road signs to be made removeable Island to be made driveable
		East of intersection	Power poles to be protected
		West of intersection	Kerbing to be made mountable, temporary pavement to be constructed along OD wheel-path
GG	Strzelecki Highway – Golden Gully Road Intersection	East of intersection	Temporary pavement to be constructed along OD wheel-path
		West of intersection	Vegetation (including identified native vegetation) to be cleared through vehicle swept path Temporary pavement to be constructed along OD wheel-path

Pinch Point	Intersection	Location	Mitigation
			Road signs to be removed
		South of intersection	Temporary pavement to be constructed along OD wheel-path Existing culvert / roadside drain to be protected or relocated
GG4	Golden Gully Road – McDonalds Track Intersection	East of intersection	Construction of new access suitable for OD use, including removal of native vegetation
		West of intersection	Construction of new access suitable for OD use, including removal of native vegetation
SR	Strzelecki Highway – Smiths Road Intersection	North-west of intersection	Road sign to be removed Remove native vegetation and tree at intersection Temporary pavement to be constructed along OD wheel-path Diversion of roadside swale Culturally significant tree may need to be removed with current OD site access point (access point 02).
		East of intersection	Remove native vegetation within vehicle swept path Temporary pavement to be constructed along OD wheel-path
		South-west of intersection	Remove native vegetation within swept path Temporary pavement to be constructed along OD wheel-path
CR	Strzelecki Highway – Creamery Road Intersection	West of intersection	Remove native vegetation within swept path Temporary pavement to be constructed along OD wheel-path Road sign to be made removeable
		East of intersection	Remove native vegetation within swept path Temporary pavement to be constructed along OD wheel-path Road sign to be made removeable
CR-T11	Creamery Road Main Access North (T11)	East of intersection / South of intersection	Remove native vegetation within swept path

Pinch Point	Intersection	Location	Mitigation
			Temporary pavement to be constructed along OD wheel-path
CR-T27	Creamery Road Main Access South (T27)	North of intersection / West of intersection	Remove native vegetation within swept path Temporary pavement to be constructed along OD wheel-path

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 site access points and all utilised public road intersections between Marretts Road and the site in accordance with AGRD4a. 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, with the exception of Smiths Road Main Access, which had insufficient SISD and MGSD for turning traffic

It is noted that the Smiths Road main access intersection is located within 20 metres of the Smiths Road and Strzelecki Highway, and has limited line of sight to left-turning traffic from Strzelecki Highway. It is likely that additional controls, such as reduced speed on Strzelecki Highway and temporary signage may be required throughout construction to improve the safety of the intersection.

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 15 for rural road criteria for a design speed less than 100 km/h, noting Strzelecki Highway 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.

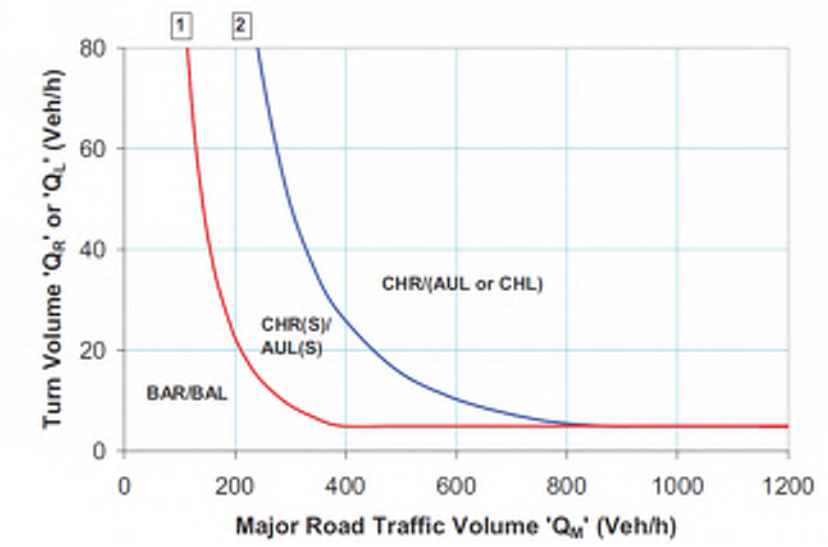


Figure 15 Austroads design guidelines for intersections (Design speeds ≥ 100km/hr)

Source: Austroads Guide to Road Design Part 4

With reference to Figure 15 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 on days where WTG foundations are to be poured, traffic at nominated intersection may temporarily exceed the threshold levels in which additional turning treatments may be recommended by Austroads. Given these levels of peak traffic are only expected to occur over one day intervals, and represent a small portion of the construction period, these additional treatments are not considered warranted. Further traffic control and mitigation measures, such as temporary speed reductions and traffic management are recommended during foundation pours 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	
-	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.
GG	Strzelecki Highway	Golden Gully Road	AUR	BAL, BAR	It is noted that the BAL treatment is recommended in AustRoads for the Golden Gully road intersection based on the existing traffic volumes. Left-turn movements into Deans Road are only predicted to increase by 10 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
CR	Strzelecki Highway	Creamery Road	No treatments	BAL BAR	CHR and CHL treatments proposed as part of Regional Roads Victoria upgrades to Strzelecki Highway. There may be an opportunity to combine upgrade intersection upgrade works with RRV's proposed treatments.

8.4 Road section upgrades

Many roads surrounding the Delburn Wind Farm site proposed to be used by construction vehicles are single-lane two-way roads, including: Deans Road and Golden Gully Road.

One-lane two-way roads produce 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 and OD vehicles generated during the construction phase.
2. The increased 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 along key routes
- Providing passing bays at key locations
- Traffic management measures
- 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 Department of Transport) 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 Intersection Treatment Footprints

AECOM has developed a concept sketch for the Strzelecki Highway and Creamery Road priority intersection. This sketch is intended to be used as an example to give an indication of the scale of works typically required for intersections along the route to facilitate the worst-case OD wind blade transportation vehicle (90 metres in length). The sketch is shown below in Figure 16, and has also been attached in Appendix D.

It is noted that the concept sketch has been developed based on the following assumptions and limitations:

- The concept designs are based on available high-resolution aerial imagery rather than feature and level survey.
- Concept designs have been undertaken in 2D only, so the full extent of works is not known
- Widening extents have been based on the swept path of the blade delivery vehicle outlined in Section 7.2.2, which will change when the WTG manufacturer and transport contractor are engaged
- It is assumed that RRV's proposed Strzelecki Highway upgrade occurs after the construction of Delburn Wind Farm

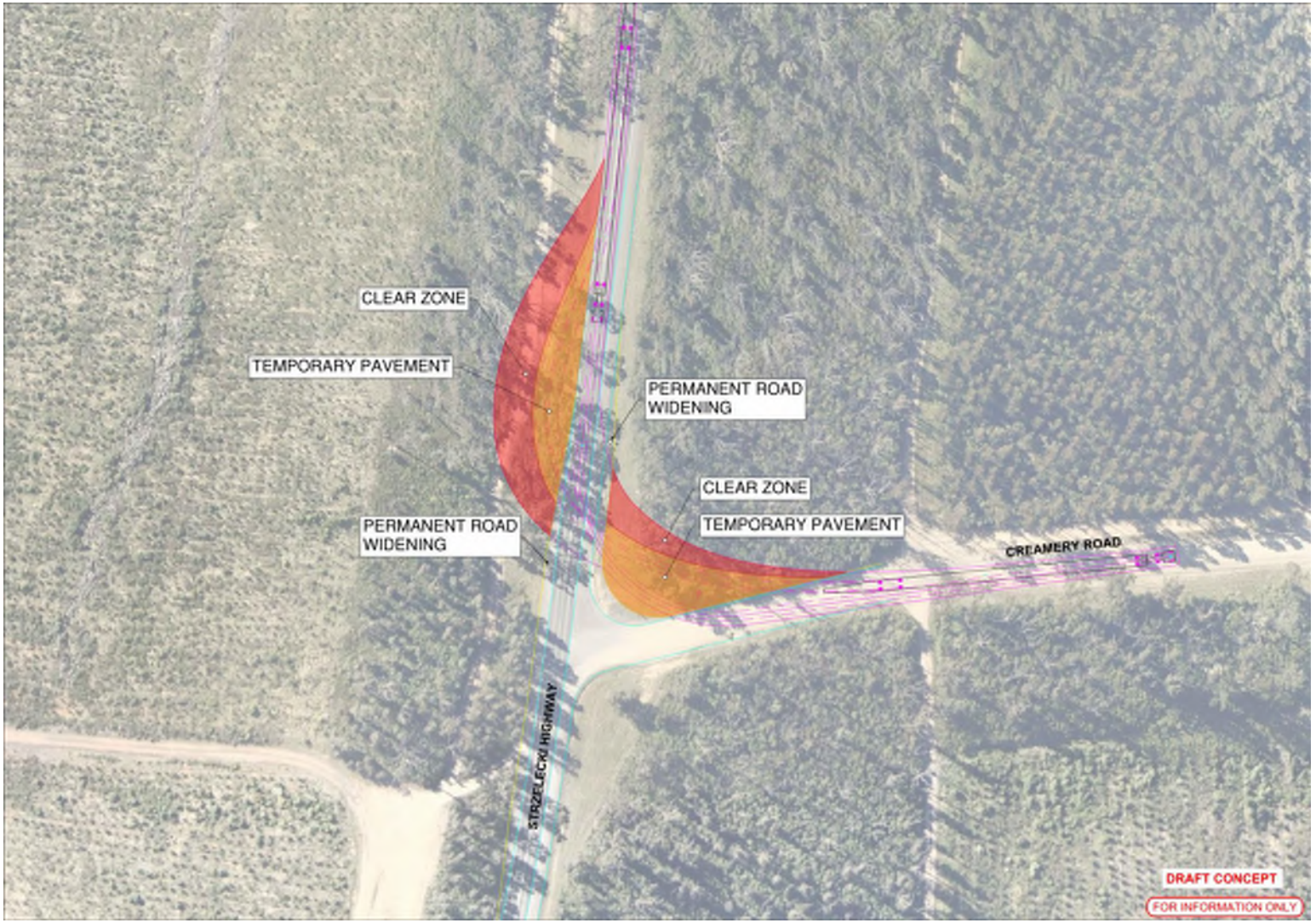


Figure 16 Strzelecki Highway – Creamery Road Intersection Upgrade Concept Sketch

9.0 Other considerations

9.1 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.

9.2 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 RRV when the projects TMP is developed.

9.2.1 Driver distraction

Delburn Wind Farm includes WTGs situated close to public roads (a minimum setback of 100m from the road reserve has been applied as a constraint), which RRV have flagged as a potential safety concern as these could be perceived as a distraction for road users travelling along Strzelecki Highway.

There are currently no detailed policies or guidelines with regards to the placement of WTGs in proximity to roads for safety reasons. A desktop review of studies into the interaction between WTG placement on driver behaviours from various jurisdictions in Australia and overseas where WTGs are prevalent was undertaken, and it is noted that there no clear conclusions regarding the impact of WTGs on driver safety.

Delburn Wind Farm Pty Ltd have developed photomontages at selected locations along the Strzelecki Highway to provide an idea to stakeholders of the likely visual impact the WTGs will have on road users, see Appendix E.

It has been noted that shadow flicker, the moving shadow cast by a WTG along the ground, was raised by RRV as an additional area of potential driver distraction along with the WTG itself. Whilst there are currently no Victorian guidelines specifically addressing shadow flicker on roads, it has been addressed in several panels for other Victoria based Wind Farm developments including:

- Wonthaggi Wind Farm,
- Hawkesdale Wind Farm,
- Woolsthorpe Wind Farm,
- Berrybank Wind Farm; and
- Stockyard Hill Wind Farm.

It is noted that a high degree of natural shadow flicker or light variation is already experienced along the local road network as a result of the roadside vegetation. The photomontages provided in Appendix E show the level of roadside vegetation along the Strzelecki Highway and existing filtering of light on the road. A shadow flicker assessment has been undertaken separately for Delburn Wind Farm Pty Ltd, which may be made available upon request.

Delburn Wind Farm Pty Ltd plan to provide dedicated viewing areas located off the Strzelecki Highway (on Smiths Rd) and associated signage to allow road users the opportunity to safely observe the WTGs.

9.2.2 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.

Of the access points, access point 02 – the main access from smiths road towards WTG09 – is at an elevated risk of collisions, as it is located within 50 metres of Strzelecki Highway, and serves multiple WTGs.

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.

9.2.3 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 roads of Deans Road and Golden Gully Road. Risk mitigation measures for head-on collisions are to be documented as part of the TMP.

9.2.4 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.

9.2.5 OD and construction vehicle impacts

Over-dimensional 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 pavements at Deans Road and Golden Gully Road in particular, are unlikely to have been designed for such large vehicle loads associated with WTG 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 both Smiths Road and Creamery Road are used frequently by plantation trucks, the risk to these roads is likely to be somewhat reduced.

Similarly, existing infrastructure such as the culverts crossing Golden Gully Road may not be designed for the loads associated with some of the heavier WTG components, such as the nacelle. Damage to culverts can result in deterioration of the road pavement which can act as a hazard to road users.

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.

9.2.6 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. 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 Traffic Management Plan.

10.0 Summary and Next Steps

10.1 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 Delburn Wind Farm.

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 at the development of the TMP for the project in consultation with key stakeholders.

10.2 Next steps

10.2.1 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 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

10.2.2 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 six 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 last 5 years of crash data for relevant roads within a 2 kilometre distance of the project site. Figure 17 shows the location of the crashes in proximity to the Delburn Wind Farm development, with Table 10-1 providing a summary of the recorded crashes.

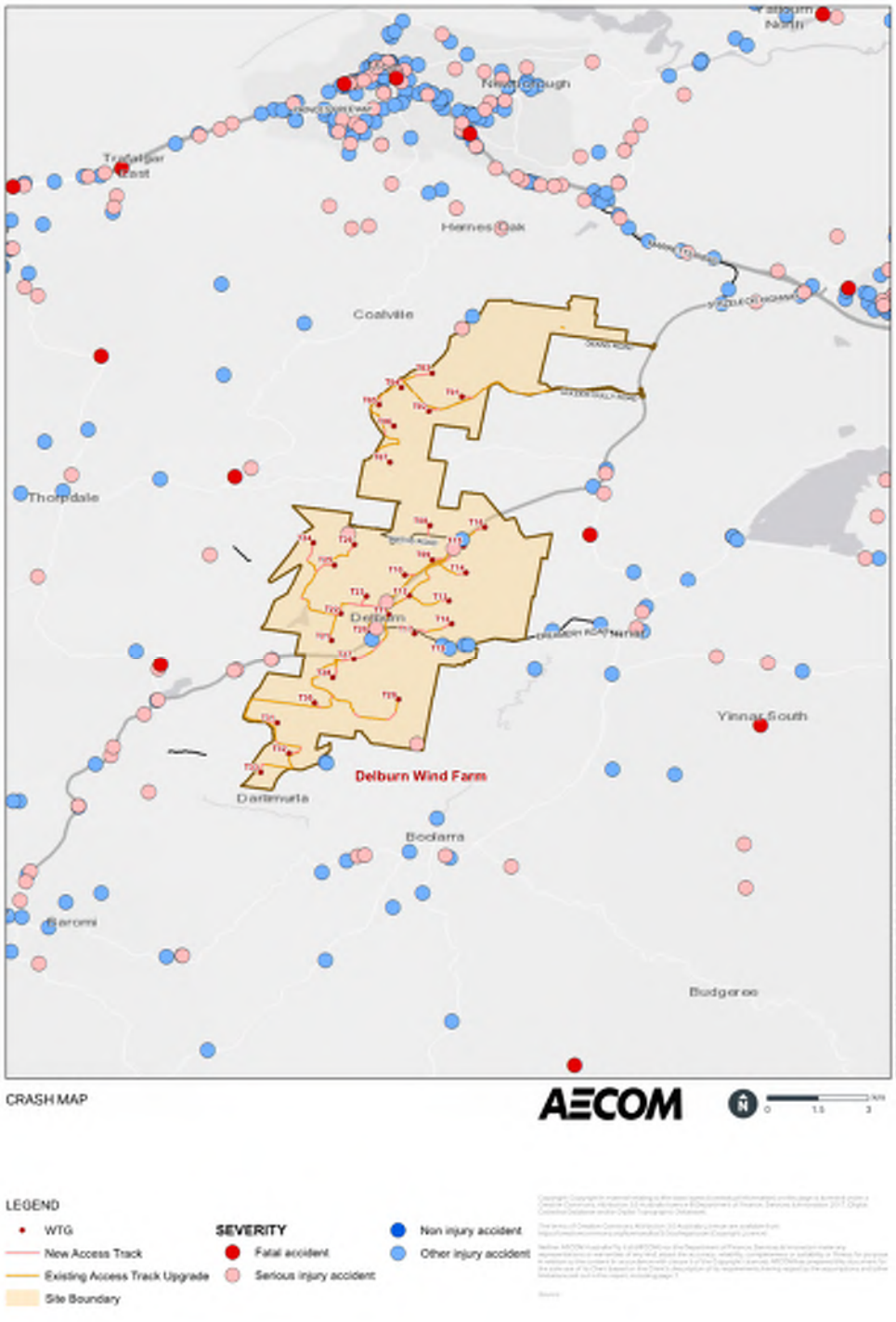


Figure 17 Local of crashes near Delburn Wind Farm

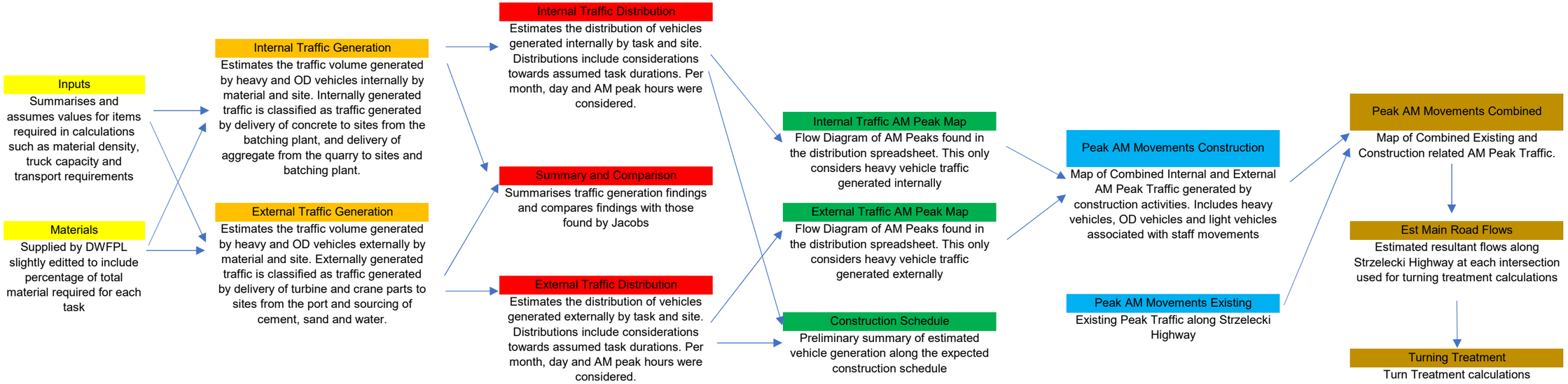
Table 10-1 Summary of recorded crashes for past 5 years

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.
Golden Gully 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.
Creamery Road	• Multiple injury crashes were recorded along a section of Creamery Road approximately 1.6-2.2 kilometres east of the intersection between Strzelecki Highway and Creamery Road with similar accident classifications in 2014, 2016 and 2019. The accident classification was an off carriageway left turn into an object or parked vehicle. One collision occurred during dusk/dawn, but the time of collision was unknown for the other two cases. • An injury crash was recorded on the 26th January 2018 approximately 2.4 kilometres east of the intersection between Strzelecki Highway and Creamery Road. It occurred during the day and the accident classification was an off carriageway on right bend.
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>Golden Gully Road Intersection</u> • No serious of fatal crashes were recorded near this intersection over the last 5 years. <u>Smiths Road Intersection</u>

Road	Crashes
	• 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. <u>Creamery Road Intersection</u> • A serious injury crash was recorded on the 30th of October 2016. It occurred during the day and the accident classification was a right turn related vehicle to vehicle collision.

Appendix B

Traffic generation methodology



Appendix C

OD vehicle swept path analysis

ISO A1 594mm x 841mm

AECOM

CONSULTANT

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www.aecom.com

PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

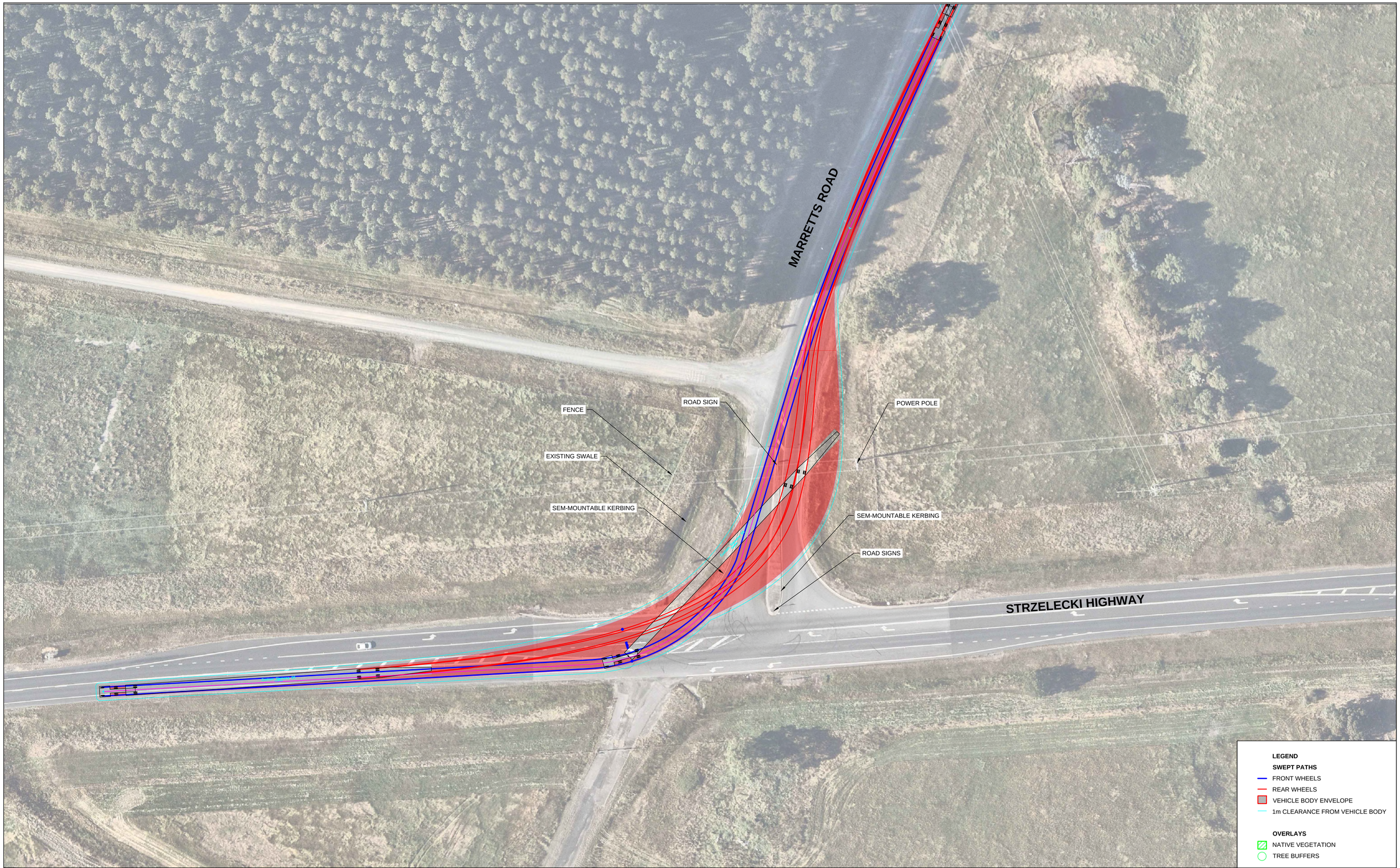
PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
PRINCES FREEWAY
MARRETTS ROAD
(PF)

ISO A1 594mm x 841mm



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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
MARRETTS ROAD
STRZELECKI HIGHWAY
(MR)

ISO A1 594mm x 841mm

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m
1:500 (A1)

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
STRZELECKI HIGHWAY
GOLDEN GULLY ROAD
(GG)

ISO A1 594mm x 841mm

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
GOLDEN GULLY ROAD
PINCH POINT 1
(GG1)

ISO A1 594mm x 841mm

AECOM

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

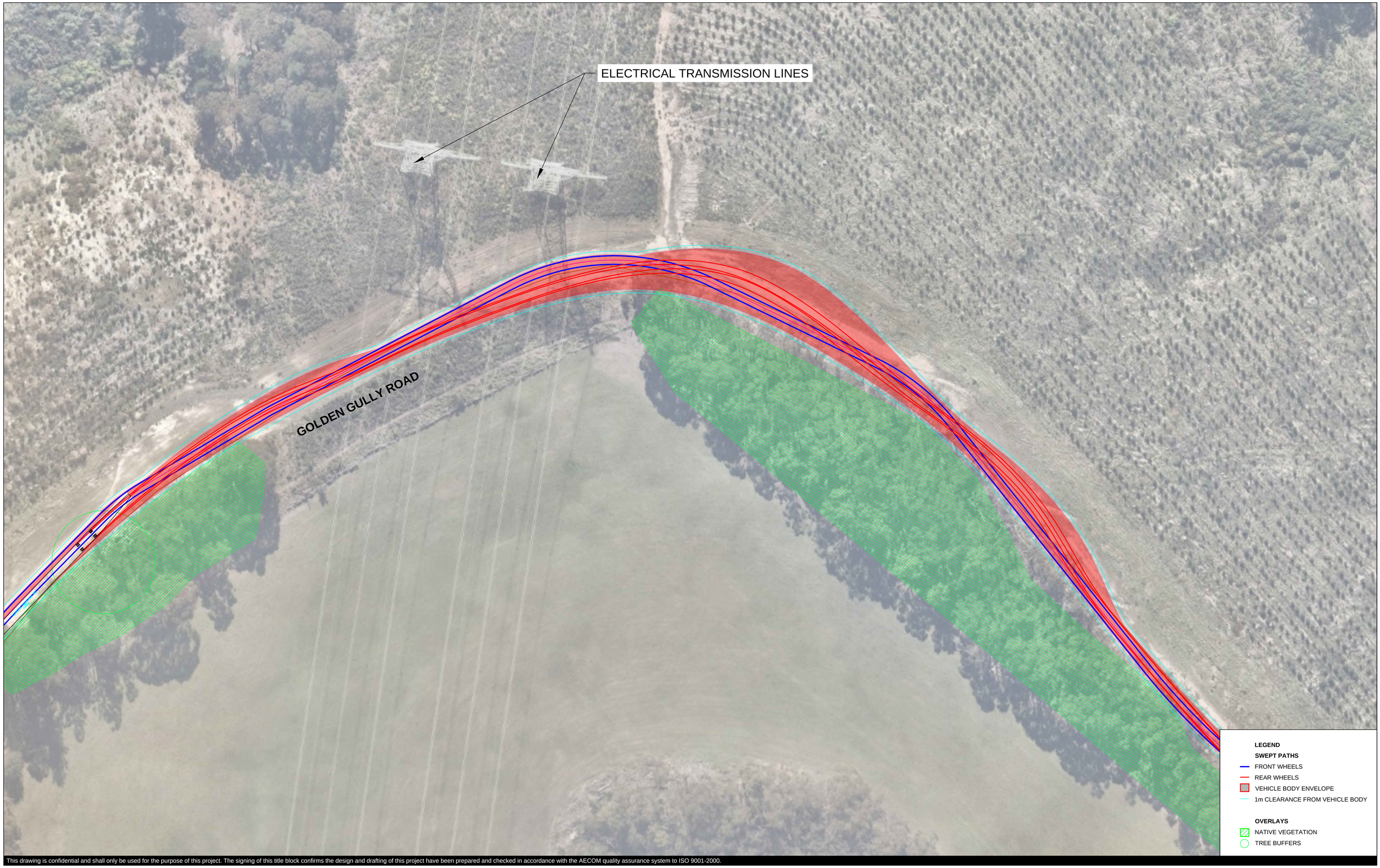
PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
GOLDEN GULLY ROAD
PINCH POINT 2
(GG2)

ISO A1 594mm x 841mm



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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

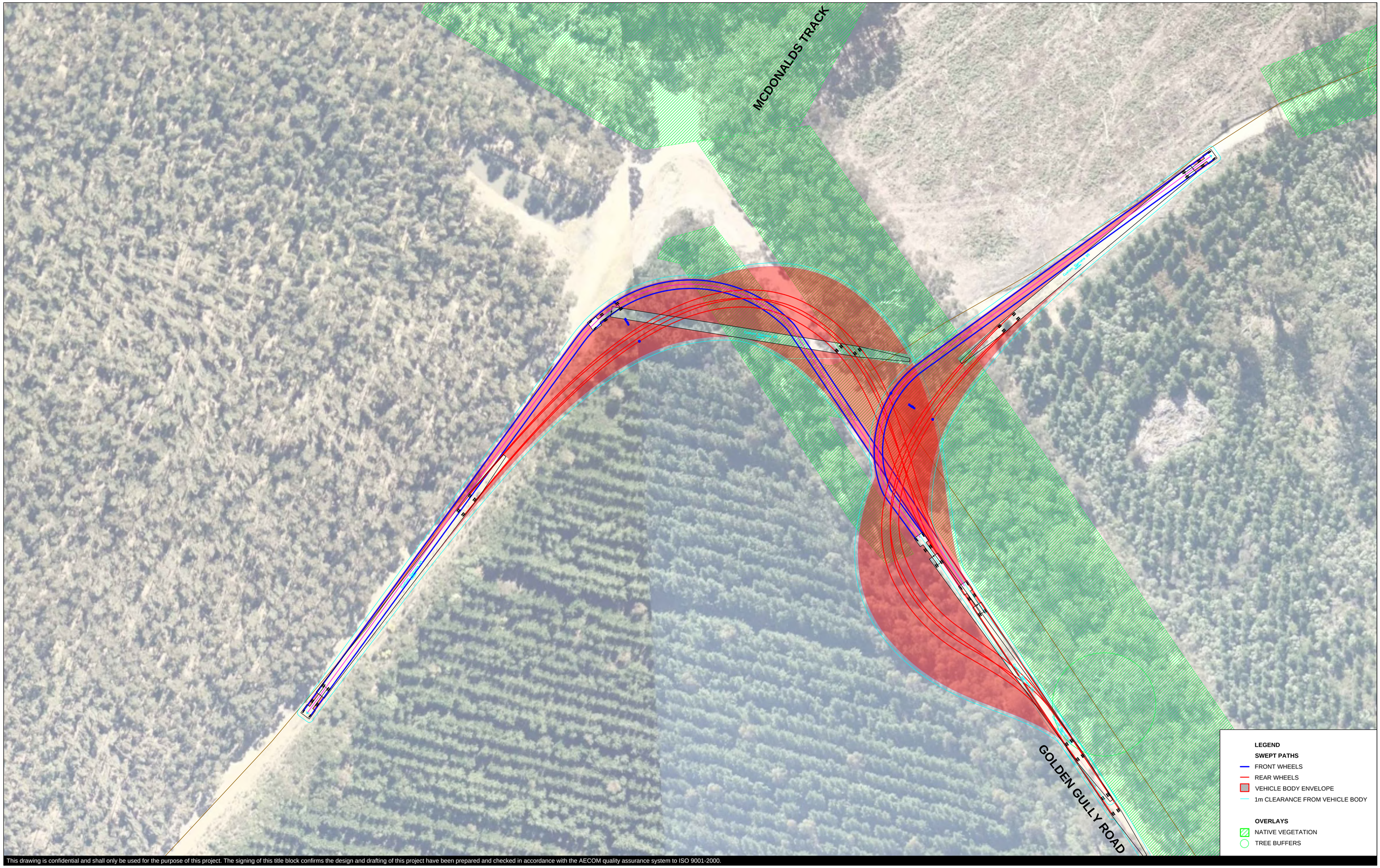
PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
GOLDEN GULLY ROAD
PINCH POINT 3
(GG3)

ISO A1 594mm x 841mm



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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

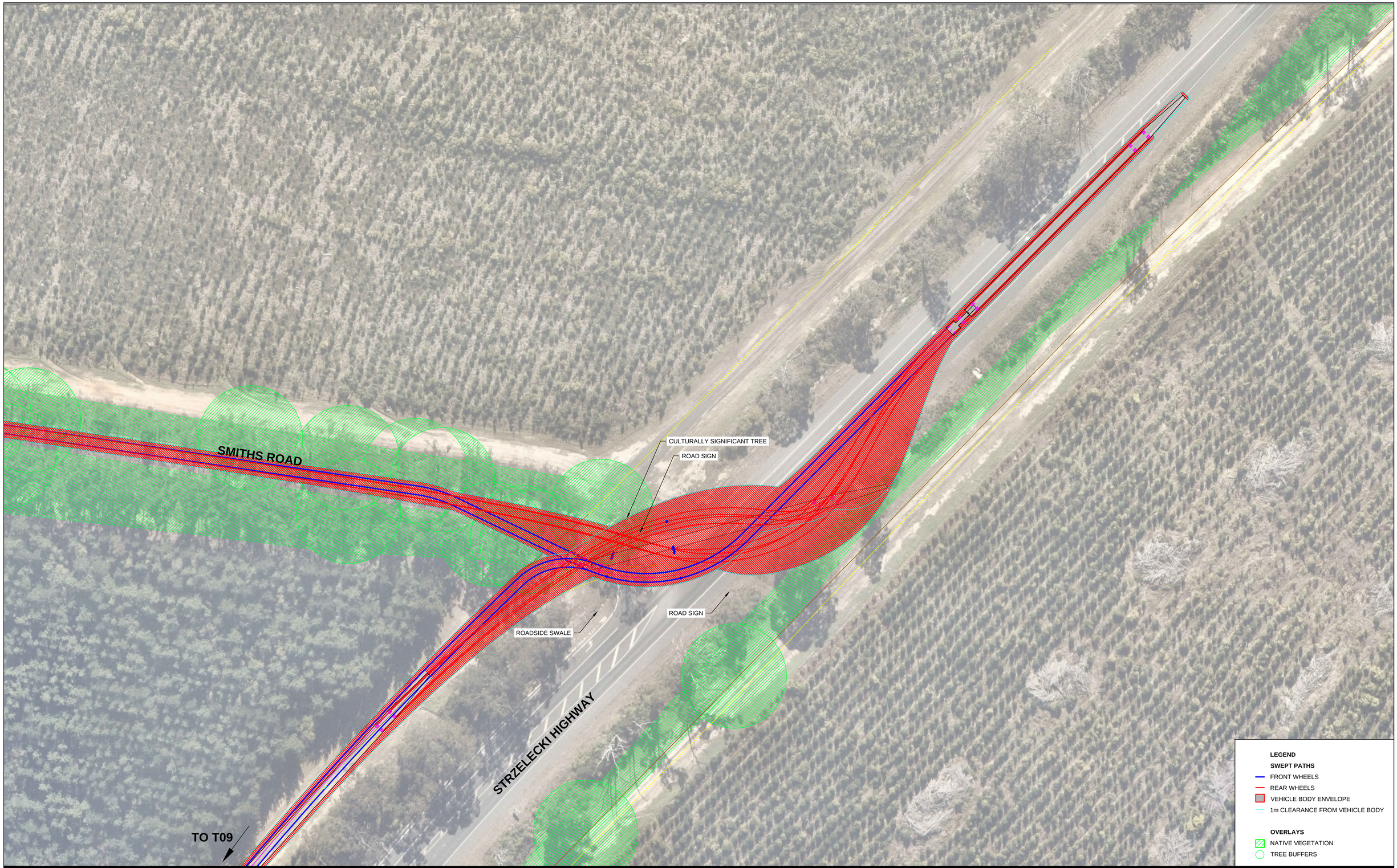
PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
GOLDEN GULLY ROAD - MCDONALDS TRACK INTERSECTION
(GG4)

ISO A1 594mm x 841mm



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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
STRZELECKI HIGHWAY
SMITHS ROAD
(SR)

ISO A1 594mm x 841mm

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
SMITHS ROAD TO T12 INTERSECTION
(SR2)

ISO A1 594mm x 841mm

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

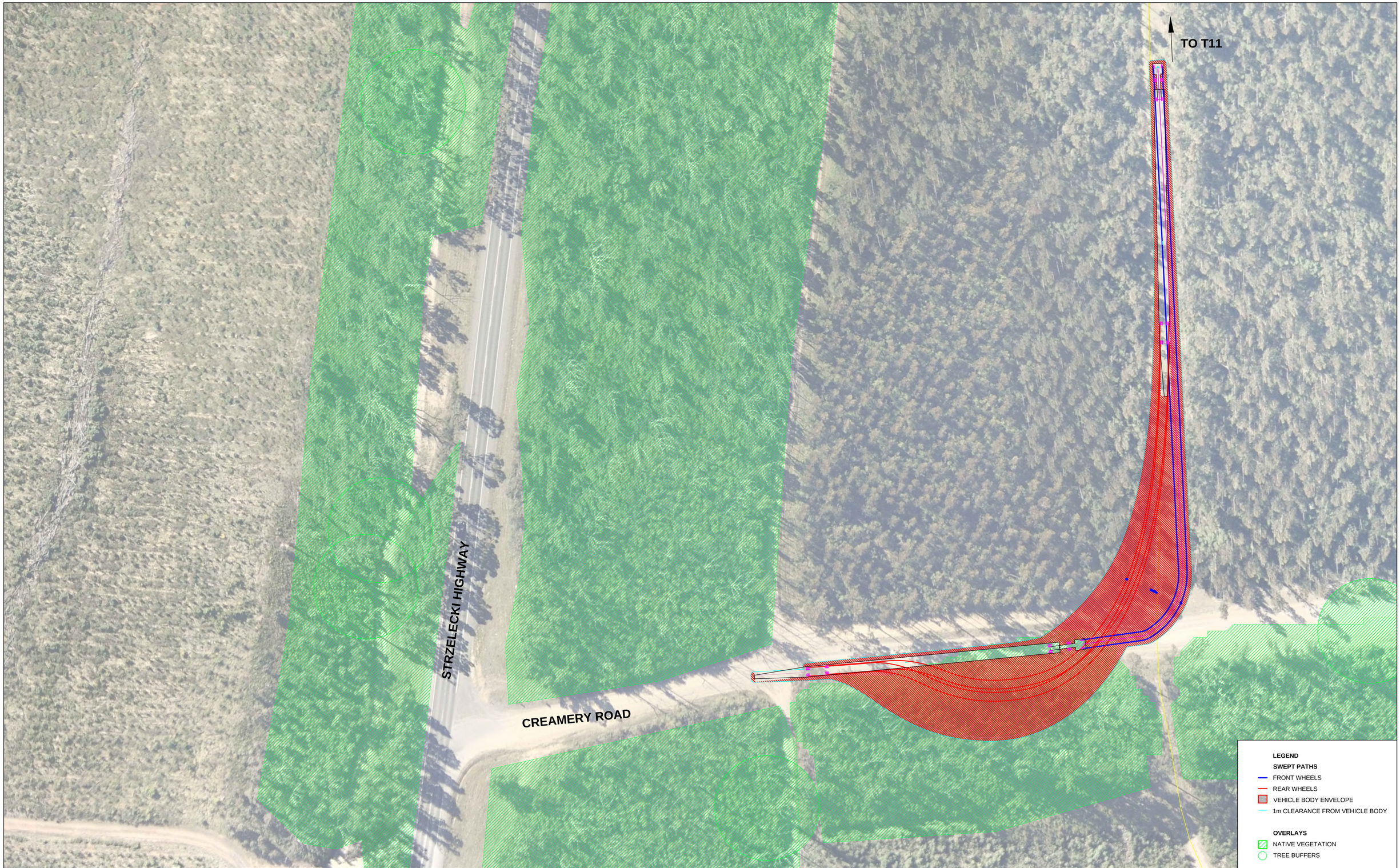
PROJECT NUMBER

60629780

SHEET TITLE

VEHICLE SWEPT PATHS
STRZELECKI HIGHWAY
CREAMERY ROAD
(CR)

ISO A1 594mm x 841mm



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PROJECT

DELBURN WIND FARM TIA

CLIENT

DELBURN WIND FARM PTY LTD

PROJECT DATA

DATUM		SURVEY	

SCALE

0 12.5 25 m
1:500

PROJECT NORTH

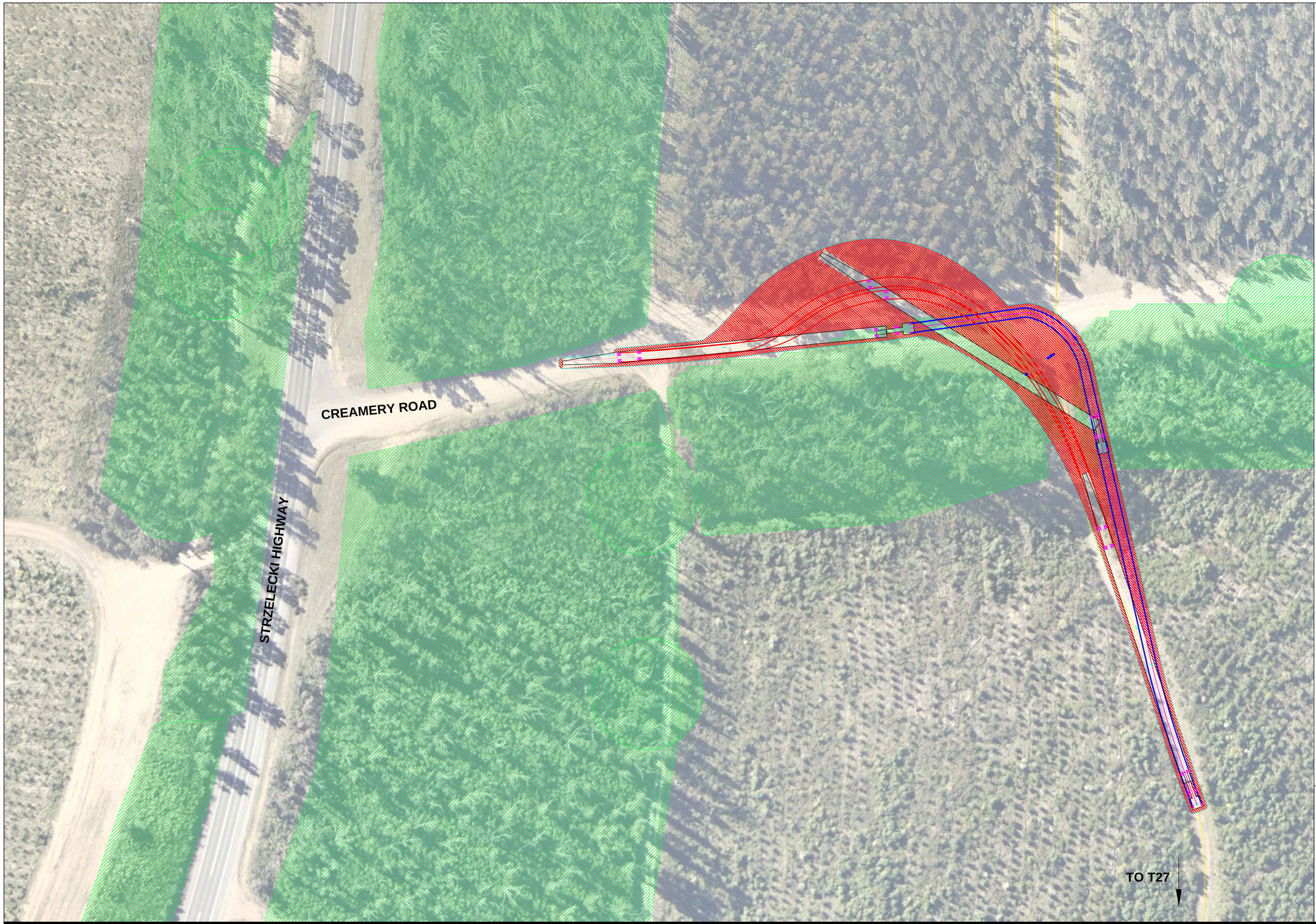
N

PROJECT NUMBER

SHEET TITLE

VEHICLE SWEPT PATHS
STRZELECKI HIGHWAY
CREAMERY ROAD T11
(CR-T11)

ISO A1 594mm x 841mm



LEGEND

SWEPT PATHS
- FRONT WHEELS
- REAR WHEELS
- VEHICLE BODY ENVELOPE
- 1m CLEARANCE FROM VEHICLE BODY

OVERLAYS
- NATIVE VEGETATION
- TREE BUFFERS

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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

SHEET TITLE

VEHICLE SWEPT PATHS
STRZELECKI HIGHWAY
CREAMERY ROAD T27
(CR-T27)

Appendix D

Intersection concept designs

ISO A1 594mm x 841mm

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PROJECT

DELBURN WIND FARM TRAFFIC IMPACT ASSESSMENT

CLIENT

DELBURN WIND FARM PTY LTD

ADVERTISED PLAN

PROJECT DATA

DATUM	MGA94 Z55	SURVEY	

SCALE

0 12.5 25 m

1:500 (A1)

PROJECT NORTH

N

PROJECT NUMBER

60629780

SHEET TITLE

STRZELECKI HIGHWAY
CREAMERY ROAD INTERSECTION (CR)
CONCEPT DESIGN

Appendix E

WTG Visualisations / Photomontages

delburn WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33238

LOCATION
Strzelecki Highway 1

COORDINATES
S -38.331301
E 146.248384

CAMERA ALTITUDE
256.6m

DATE / TIME
5/05/2020 1:47:24 PM

HEADING
86°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)

osmi AUSTRALIA

delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33241

LOCATION
Strzelecki Highway 2

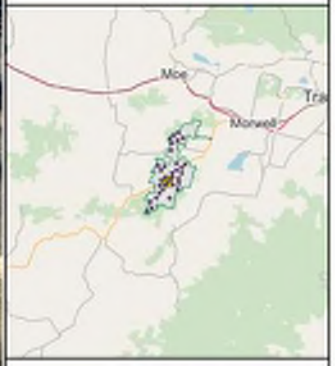
COORDINATES
S -38.321430
E 146.260043

CAMERA ALTITUDE
264.1m

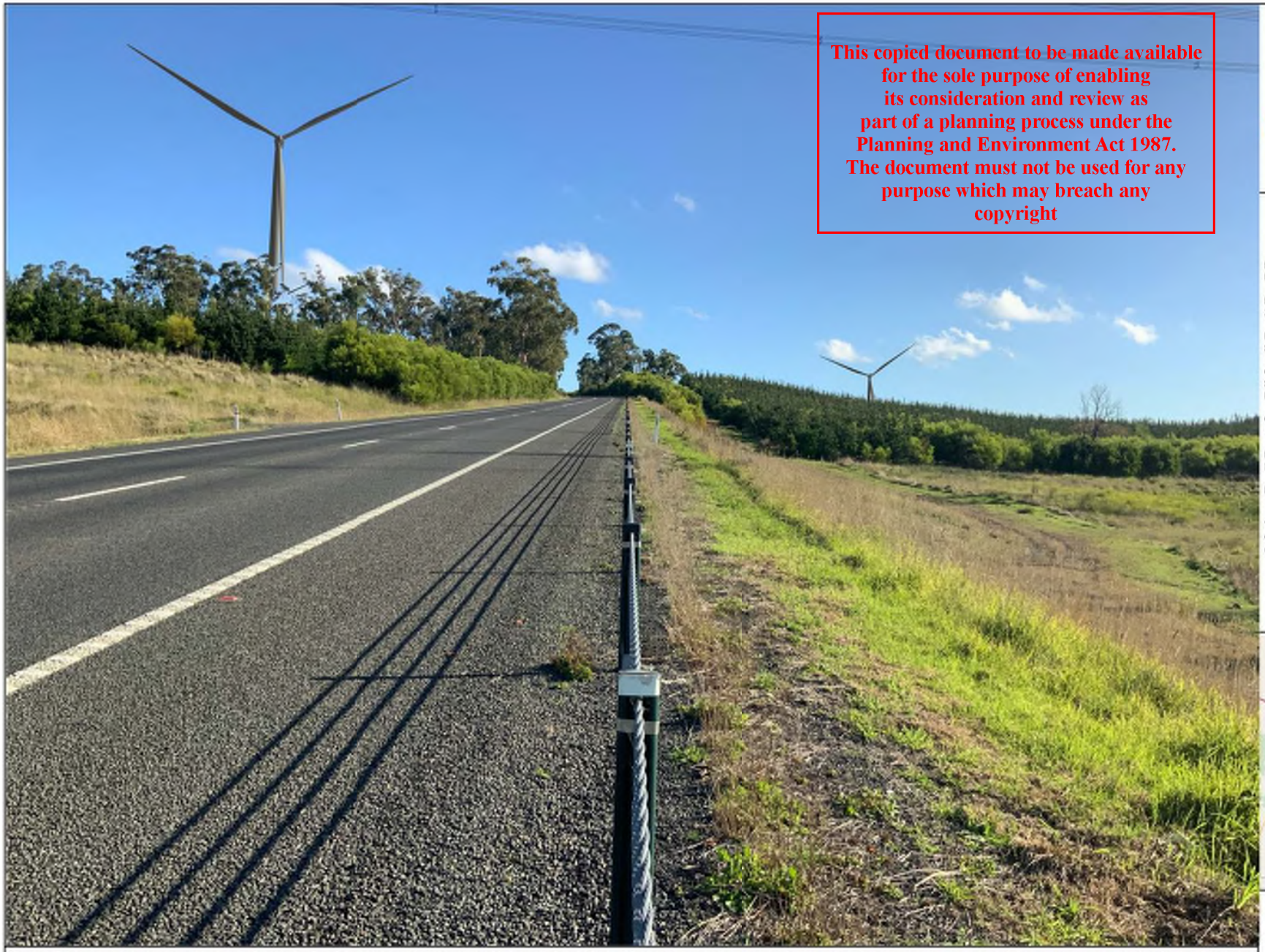
DATE / TIME
5/05/2020 2:09:04 PM

HEADING
187°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)



osmi
AUSTRALIA



delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33245

LOCATION
Strzelecki Highway 3

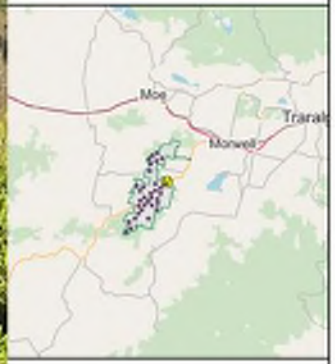
COORDINATES
S -38.292731
E 146.293664

CAMERA ALTITUDE
149.2m

DATE / TIME
5/05/2020 2:37:01 PM

HEADING
243°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)



osmi
AUSTRALIA

delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33247

LOCATION
Strzelecki Highway 4

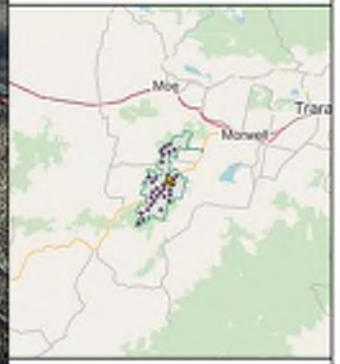
COORDINATES
S -38.305062
E 146.278196

CAMERA ALTITUDE
207.9m

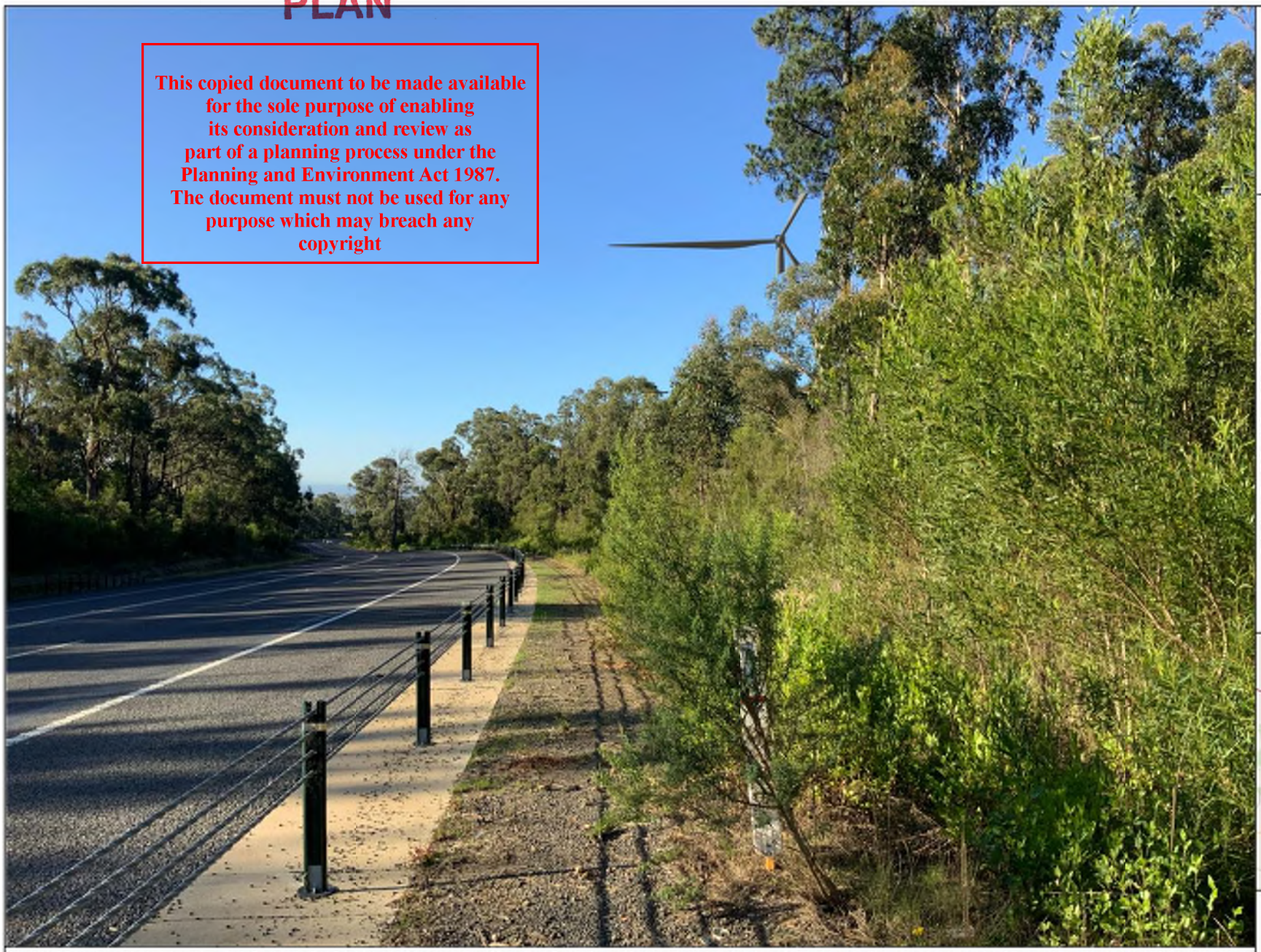
DATE / TIME
5/05/2020 3:05:26 PM

HEADING
227°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)



osmi
AUSTRALIA



delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33249

LOCATION
Strzelecki Highway 4

COORDINATES
S -38.305045
E 146.278282

CAMERA ALTITUDE
207.7m

DATE / TIME
5/05/2020 3:20:55 PM

HEADING
39°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)

osmi
AUSTRALIA

delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33289

LOCATION
Strzelecki Highway S

COORDINATES
S -38.332102
E 146.232136

CAMERA ALTITUDE
229.7m

DATE / TIME
18/05/2020 8:09:32 AM

HEADING
89°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)

osmi
AUSTRALIA

delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33290

LOCATION
Strzelecki Highway S

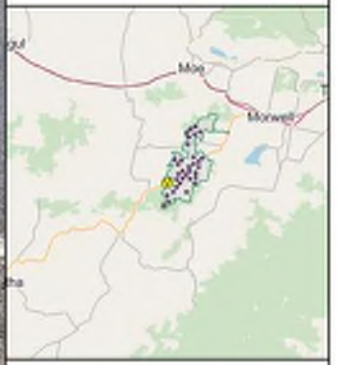
COORDINATES
S -38.332105
E 146.232134

CAMERA ALTITUDE
229.8m

DATE / TIME
18/05/2020 8:09:35 AM

HEADING
64°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)



osmi
AUSTRALIA

delburn
WIND FARM

PROJECT
Delburn Wind Farm

PHOTO ID
33292

LOCATION
Strzelecki Highway 6

COORDINATES
S -38.331122
E 146.236583

CAMERA ALTITUDE
239.2m

DATE / TIME
18/05/2020 8:12:53 AM

HEADING
85°

TURBINE LAYOUT
v 3.4
(180m rotor diameter, 160m hub-height)

osmi
AUSTRALIA