

## White Rock Wind Farm

### Traffic and Transport Impact Assessment



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## 1. INTRODUCTION

This report provides an assessment of the traffic and transport issues relevant to the construction and operation of the proposed White Rock Wind Farm. It forms an appendix to the Environmental Assessment for the project.

The report considers the relevant traffic and transport implications for the project, assesses the potential impacts arising from the project and proposes mitigation measures to be incorporated in the environmental management plan to minimise traffic related impacts.

The maximum traffic impacts will occur during the construction phase which generates the maximum traffic volumes including heavy and oversized vehicles. This report focuses on the construction impacts on the public road network in the immediate surrounds of the project considering the likely wind farm components and construction schedule. This report considered the traffic and transport assessment (Glenn Innes Wind Farm Traffic and Transport Issues Assessment by Connell Wagner May 2008) prepared for the adjacent Glen Inness wind farm.

### 1.1 PROJECT LOCATION

The proposed White Rock Wind Farm is located in the New England Tableland of NSW, about 20 km west of Glen Innes. The wind farm is located on a number of elevated ridges which run in a north-south direction. The closest main road to the wind farm site is the Gwydir Highway which borders on the northern end of the wind farm site.

Parts of the wind farm are within the Glen Innes Severn Shire and is subject to the Severn Local Environmental Plan (LEP) 2002 which shows the wind farm site and its immediate surrounds as being within Zone 1(a) Rural. The remainder of the wind farm is within the Inverell Shire. White Rock Wind Farm will be located on private properties that are primarily used for sheep and cattle grazing. The development will be assessed by the NSW Department of Planning as a Major Project under Part 3A of the EPA Act.

The White Rock Wind Farm is adjacent to the Glenn Innes Wind Farm which received Project Approval from the Minister on 2 October 2009 and re-affirmed by the NSW Land and Environment Court on 18 August 2010.

### 1.2 PROJECT DESCRIPTION

The Project Application seeks approval for 119 wind turbines and associated infrastructure including access tracks. An electrical substation will be located on the proposed wind farm and a transmission line will connect the wind farm to TransGrid's newly upgraded 132 kV transmission line (Inverell to Glen Innes) which crosses the northern end of the site.

This assessment is based on wind turbine models with a generating capacity of between 1.5 and 3.4 MW, a hub height of approximately 80m with a rotor diameter of up to 112m. Table 1 below provides the number and approximate weight of the components of a typical wind turbine.

Wind Turbine Component	No. of parts per turbine	Total number of parts for 119 turbines	Approximate component weight (tonnes)
Towers	3	357	Up to 60
Nacelle	1	119	Up to 80
Hub	1	119	Up to 23
Blades	3	357	Up to 12

**Table 1 – Wind turbine components**

The construction phase of the project will involve the establishment of temporary construction facilities, access tracks, crane hardstand areas and foundations at each turbine location, underground electrical cabling, erection of wind turbines and the construction of the electrical substation and associated switchgear and control room buildings.

The construction of the wind farm will take between 18 – 24 months and will involve vehicle movements undertaking the following key activities:

- Initial site establishment, including installing temporary site facilities, access tracks and excavation of the foundations;
- Installation of the foundations for the wind turbines, including reinforced concrete gravity foundations and potentially rock anchors depending on the geological conditions and final engineering design. Concrete batching plants are proposed on-site and raw materials will be trucked in;
- Construction of the electrical infrastructure including the substation and facilities buildings; and
- Delivery of turbine components, their erection and commissioning.

## **2. KEY ISSUES AND THEIR ASSESSMENT**

### **2.1 KEY ISSUES**

The key traffic and transport implications from the proposal arise from additional vehicle volumes and over-dimensioned vehicles accessing the wind farm site from the public road network during the project's construction and operation phase.

These issues include:

- The suitability of the existing roads for the type of vehicles that will need to access the site. Aspects affecting suitability include overall width of roads, radius and clearance at bends in the road and the nature of existing traffic use.
- The structural capacity of existing roads and structures to handle the heavy vehicles for the delivery of turbine and transformer components.
- Disturbance to the local community as a result of increased vehicle movements.
- Management of traffic on the site including traffic safety, minimising disturbance to any environmentally sensitive areas, minimising erosion and dust.

The potential environmental impacts associated with the traffic and transport arising from the project is discussed in other parts of the Environmental Assessment dealing with specific environmental issues.

## **3. PREDICTED TRAFFIC AND EQUIPMENT TRANSPORT REQUIREMENTS**

The proposed development will generate significant additional traffic movement during the construction phase and a minimal increase over the operational phase of the project. The anticipated additional traffic type and volume is described in the following section.

### **3.1 CONSTRUCTION TRAFFIC**

Construction traffic will be generated by the delivery of equipment and materials as well as the construction work force travelling to and from the site on a daily basis.

The vehicles delivering the main crane, wind turbine components and transformer components will be oversize, overmass or both. These vehicles will require special operating permits to allow them to travel on public roads and the appropriately licensed haulage contractor will complete a detailed assessment for approval by the RTA and Councils prior to construction. Because of the high quality of the surrounding roads, no difficulty in obtaining approval is envisaged.

Oversize vehicles are those over 19 m in length, 2.5 m in width and 4.3 m high and may require one or more escort vehicles to accompany them.

Overmass vehicles are those with a gross mass in excess of 42.5 tonnes and will require a permit to use public roads.

On-site access tracks will generally be around 5 m wide, but will need to wider at bends and intersections. The longest vehicles will be those delivering blades. Typically two blades are delivered in one load.

<b>Construction Activities</b> (Many occur concurrently)	<b>Approximate Duration</b> (Months)	<b>Maximum number of trips per day</b>	<b>Comments</b>
Construction Staff and management	24	60	Assumes 3 employees per vehicle
Site Establishment	1	10	
Internal access track construction	10	22	
Foundation excavation and construction	12	102	Based on off-site concrete delivery
Dust Suppression	16	12	
Substation construction and commissioning	4	26	Includes up to 4 overmass vehicles
Cabling	10	6	
Turbine erection	12	58	Includes up to 50 over-dimensioned vehicles
<b>Maximum Construction Duration</b>	<b>24</b>		
	<b>Total maximum trips per day</b>	<b>296</b>	

**Table 2 – Estimate of Peak Daily Traffic Volume**

Table 2 presents a prediction of the maximum daily traffic volumes, expressed as one way vehicle movements, of approximately 300 vehicles per day. In reality this overstates the likely trip numbers as these activities will be spread across the construction schedule and are unlikely to occur simultaneously. It also conservatively assumes that the concrete for the turbine foundations will be delivered to site rather than from on-site batching plants.

### **3.2 OPERATIONAL TRAFFIC**

A wind farm is designed to operate automatically and unmanned, but a small crew of technicians are based on the site during normal working hours Monday to Friday to carry out scheduled and non-scheduled maintenance on the wind turbines. Operational staff will regularly visit all of the wind turbine locations on site using light weight service vans or utes. It is anticipated that operational requirements including scheduled and un-scheduled maintenance will generate approximately 8 trips per day on the nearby road network.

## 4. TRANSPORT ALTERNATIVES AND ASSESSMENT

### 4.1 ROAD TRANSPORT FROM PORT TO GLEN INNES

The wind turbine components will be manufactured overseas and delivered to a major Australian port. Glen Innes is 370 km from Brisbane and 490 km from Newcastle. Both of these ports are suitable for receiving wind turbine components.

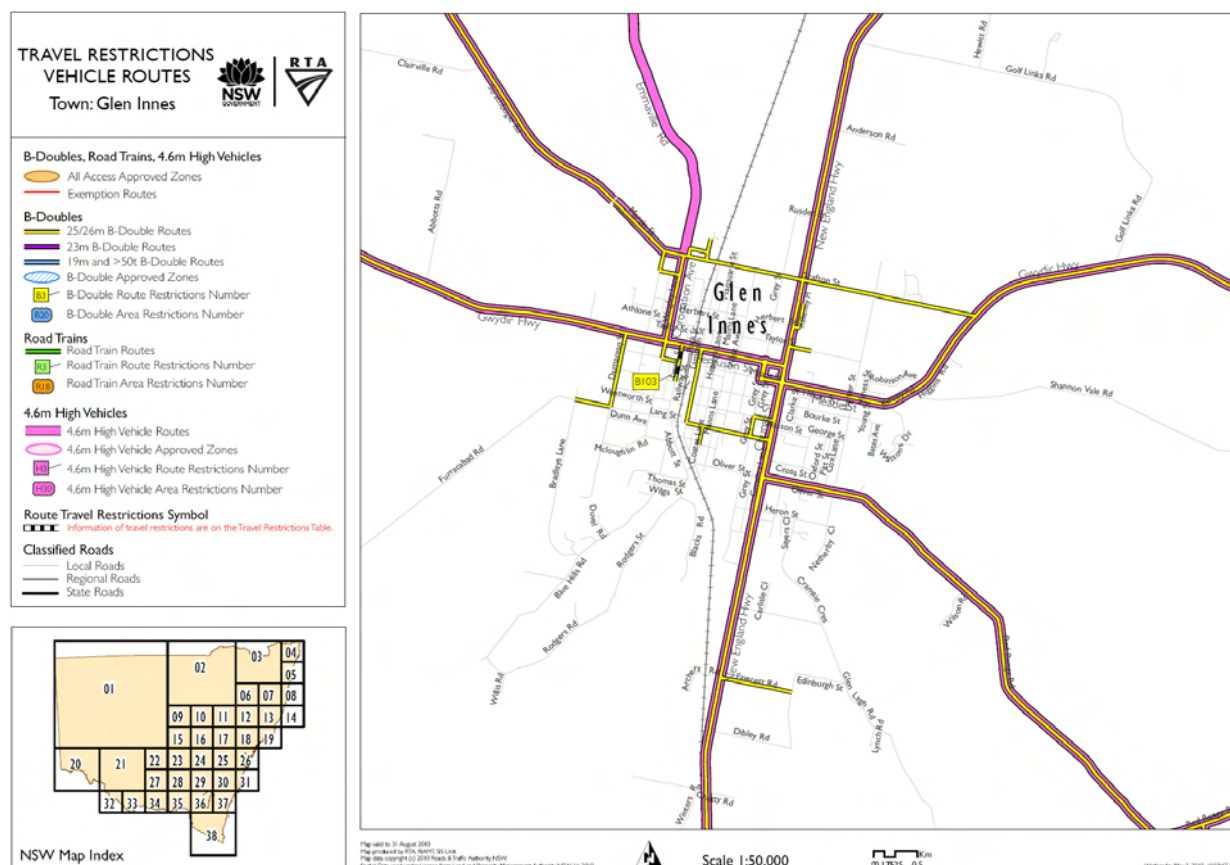


**Figure 1 – Road transport route from Brisbane**

In either case the delivery route to site would be via the New England Highway to Glen Innes and then west along the Gwydir Highway to the site access point. The RTA approved heavy vehicle routes through Glen Innes are shown in Figure 2. A project specific Traffic Management Plan will need to be developed in consultation with local stakeholders (including the Council) and in accordance with the regulations and to identify any specific timing and physical constraints on the route through Glen Innes.

It is possible that the tower sections for the turbines will be manufactured in Australia. The tower sections would be delivered by road transport following the same route via the New England Highway to Glen Innes and then west along the Gwydir Highway.





**Figure 2 – Glen Innes heavy vehicle routes**

The route from Newcastle to Glen Innes via the Gwydir Highway is a viable option for heavy vehicles as it is wide and is in good condition. There are several sections of the highway which will need more detailed assessment by a transport contractor for the largest oversize loads:

- In Muswellbrook the New England Highway passes under the railway line with steep grades at either end and a tight turn on the south side and a roundabout on the northern side
- Steep ascents through Moonbi Moonbi Gap
- Several roundabouts to negotiate passing through Tamworth

The route from the Port of Brisbane will require negotiation of a route around Brisbane CBD and then via the Ipswich Motorway and Cunningham Highway to Warwick and then the New England Highway to Tenterfield and Glen Innes. The route is regularly used by B-double vehicles and oversized vehicles between Brisbane and Sydney. This route is considered generally suitable for carriage of oversized wind farm components to Glenn Innes. The sections that will require more detailed assessment by the transport contractor immediately prior to construction are:

- Cunningham's Gap
- The route through Warwick
- Between Tenterfield and Glen Innes

## 4.2 ACCESS VIA GLENN INNES AND GWYDIR HIGHWAY

The township of Glen Innes is located on the New England Highway and is accessible for vehicles travelling from either Brisbane or Newcastle. It is a significant regional centre with many commercial businesses, residences, schools, elements of tourism and varying levels of local traffic. Key considerations for transport of components through Glen Innes include:

- Timing of the vehicle movements to minimise disruption to local Glen Innes traffic and night time noise at residences along the route
- Access past roundabouts
- Avoiding the main street
- Utilising streets and intersections that are sufficient width to allow the transit of the large vehicles involved

The New England Highway leading through Glen Innes is in good condition, very wide and presents no obvious problems for the passage of the oversize vehicles. The intersection of the New England Highway and the Gwydir Highway does not present any fundamental difficulties to the transport of oversized components to the wind farm site. Large semi-trailers regularly use both highways.

There is a roundabout on the corner of the Gwydir Highway and the main street, Grey Street, which may require modification, including relocation of signage, for passage of oversize vehicles. Any modifications would be proposed following advice from the haulage contractor, would be incorporated into the Transport Management Plan and would require approval from the RTA and the Glen Innes Shire Council.

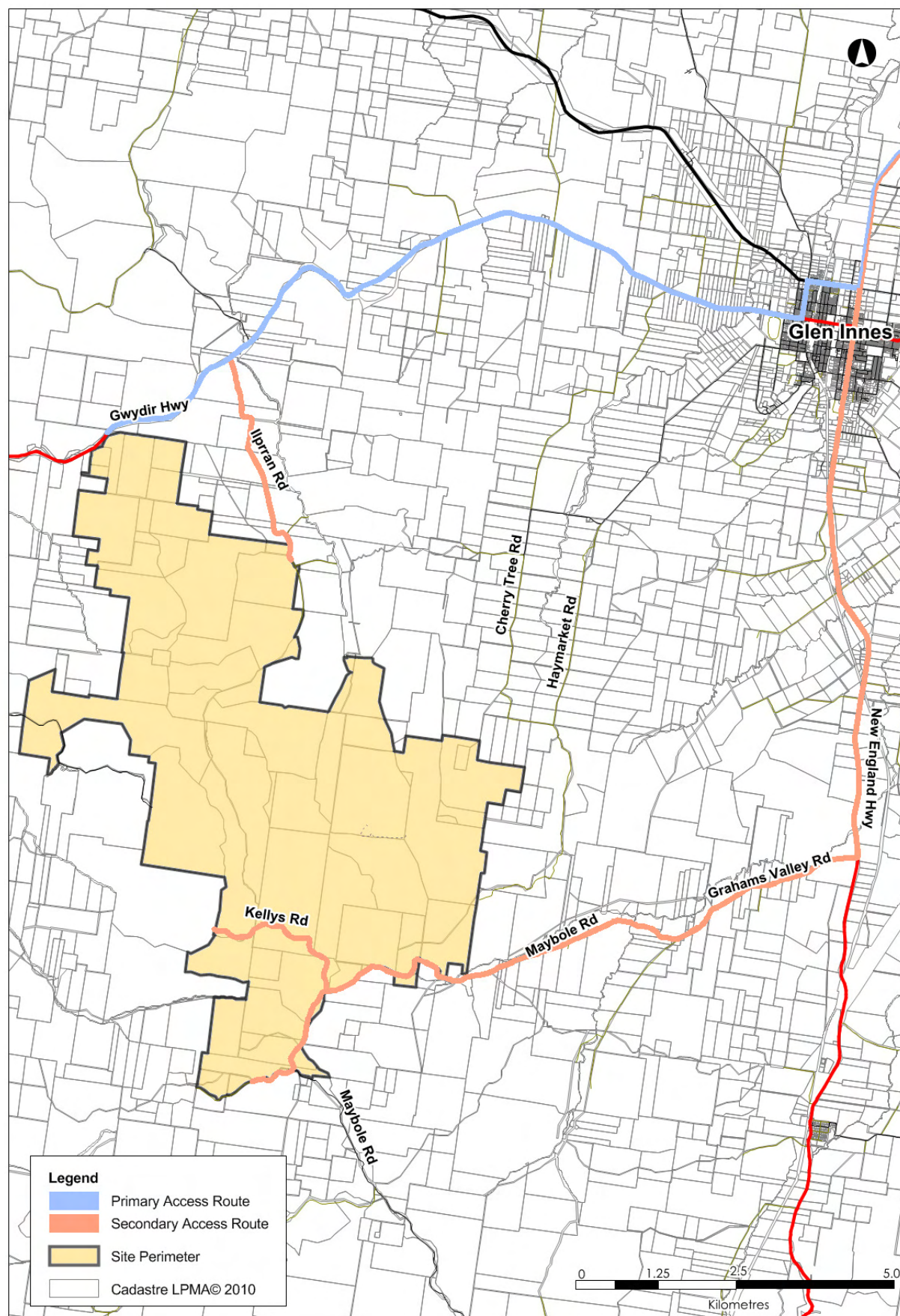


**Figure 3 – View to the west of roundabout on Gwydir Highway at Grey Street, Glen Innes**

An alternative route shown in Figure 4 overleaf involves the use of Grafton Road about 1 km north of Glen Innes. The intersection with the New England Highway appears suitable for oversize vehicles subject to minor improvements. From Grafton Road this route turns into Coronation Avenue which intersects the Gwydir Highway about 1.5 km west of Glen Innes. Minor improvements may be required at each of these intersections.

The Gwydir Highway is a two lane sealed road with a general speed limit of 100 km/h and is suitable for the proposed vehicle movements. The road is in good condition with good geometry in keeping with its speed rating. There are no townships between Glen Innes and the site, although a small number of residences occur along the route and a number of local roads join the Gwydir Highway.





**Figure 4 – Access to the site**



Figure 5 – Proposed transport route through Glen Innes



### 4.3 ACCESS ONTO THE SITE

The primary access to the project site will be from the north via an upgraded access point off the Gwdir Highway. This access point is close to the proposed substation location and operations and maintenance facilities making it a logical access location. An existing double gateway currently provides access from the Gwdir Highway.

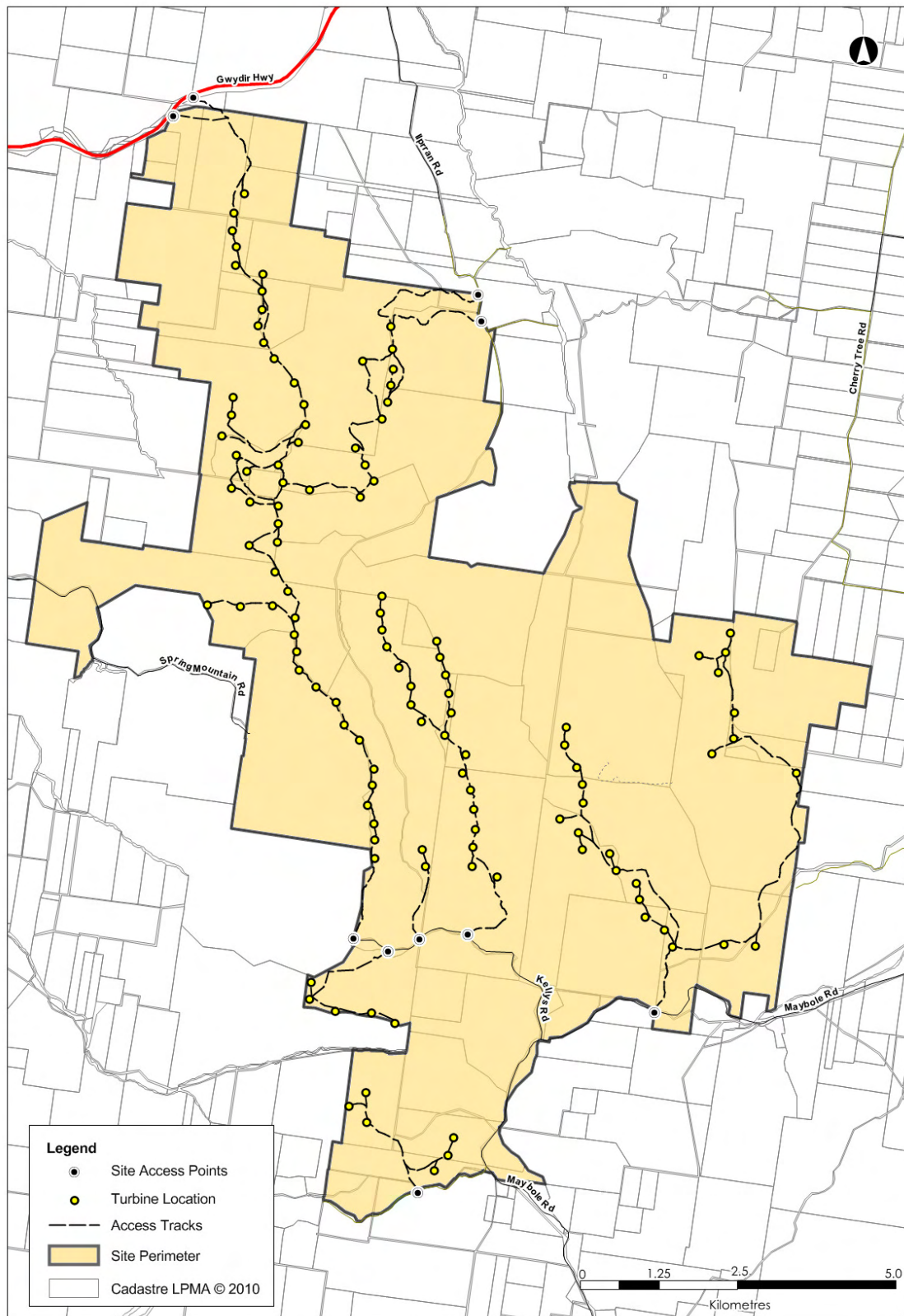


**Figure 6 – Access onto the site from the Gwydir Highway**

The Gwydir Highway is a high quality two lane highway between Glen Inness and Inverell. The turn off to and from the wind farm will be signposted and designed to allow vehicles to exit and enter the highway safely in accordance with RTA design requirements incorporating the required line of sight distances. The gate or grid at the site boundary will be set back from the road such that there is standing room for the largest vehicle that is clear of the highway.



**Figure 7 – Gwydir Highway at the proposed site access point**



**Figure 8 – Access points and access tracks on site**



The alternate access to the site from the south would utilise Grahams Valley Road, Maybole Road and Kellys Road. Grahams Valley Road and Maybole Road are sealed roads. Kellys Road is a gravel road. Minor upgrades may be required to these roads. Maybole Road includes a narrow bridge and a section with a steep gradient that will be difficult for the delivery of major turbine components.



**Figure 9 – Narrow bridge on Maybole Road**



**Figure 9 – Steep gradient on Maybole Road**





**Figure 10 – Kellys Road**



**Figure 11 – Kellys Road**

#### **4.4 ACCESS WITHIN THE SITE**

Access tracks to each of the wind turbine locations will generally be across open paddocks and be along the ridgelines that the turbines are located on. The location of the access tracks has been selected with consideration for existing environmental constraints and to minimise the overall length of tracks on the site.

The internal site access tracks are generally private roads and there will be no traffic impacts to the general public from vehicle movements within the site.

Empty delivery vehicles will exit the site via the same entry point. The Traffic Management Plan will address and avoid potential scheduling conflicts of vehicles entering and leaving the site. Provision will be made on site for an area that will allow for the turning of semi trailers and oversized vehicles so no vehicles would need to reverse onto the public road network.

## **5. EXISTING TRAFFIC FLOWS**

### **5.1 ACCESS VIA MAIN HIGHWAYS**

Both Brisbane and Newcastle ports are within large cities and the surrounding roads have considerable peak traffic flows. Deliveries from these locations will need to be timed to avoid the peak periods. The New England Highway which will provide the main access route has been constructed to a high standard and is expected to be suitable for the overmass and oversize vehicles needed for the construction of the wind farm.

The RTA is responsible for the main highways in NSW. The highways running through Glen Innes are included in the RTA's asset register, however the Glen Innes Severn Council is retained to carry out the maintenance on the highways in the vicinity of Glen Innes.

The highways are used by local traffic and commercial vehicles to access or pass the town centre. They have moderate levels of use during peak periods. The RTA two-way count in 2004 (which is the most recent reported traffic data available) observed the following traffic volumes on sections of the proposed transport route:

- 6,480 vehicles per day on the New England Highway, just south of Meade Street
- 4,272 vehicles per day on the Gwydir Highway, just east of Lambeth Street
- 1,512 vehicles per day on the Gwydir Highway at the Furracabad Creek Bridge

As indicated by this data there is a significant drop off in vehicle volumes along the Gwydir Highway away from Glen Innes towards the proposed wind farm site.

Assuming all wind farm construction traffic enters the site from the Gwydir Highway, the predicted maximum daily wind farm traffic of 300 trips per day will increase traffic volumes on the Gwydir Highway by a maximum of 20%. During the operation phase, the predicted 8 vehicle movements per day are not significant.

## **6. TRANSPORT IMPACTS**

### **6.1 GENERAL**

The main impact of the proposed wind farm with regard to traffic and transport is the additional number of vehicles on the roads during the construction period and the size of some of the loads.

The amount of additional traffic generated by the wind farm will be negligible relative to the significant daily traffic volumes on the New England Highway. Some minor disruptions may be caused by the passage of the oversize vehicles where the highway does not have multiple lanes to provide adequate passing opportunities.

The additional traffic through Glen Innes and along the rural roads has the potential to cause minor disturbance to local users. Discussion with the Glen Innes Severn Council and the RTA will be required to finalise the preferred route through Glen Innes and identify any particular issues to be address in the project Traffic and Transport Plan.



**Figure 12 – Transport of turbine blades with escort vehicle**



**Figure 13 – Transport of tower section on steep site access track**

## **6.2 SUITABILITY OF EXISTING ROAD LAYOUT**

Prior to the commencement of the project a detailed route survey will be carried out by the transport contractor to ensure safe access and minimise potential impacts to other road users. If there is a need for any temporary modification of any road structures or furniture, then it will need to be discussed and agreed with the Council or the RTA as relevant.

A single access point to the wind farm site has been selected to achieve safe access and minimise community disruption during the construction stage. Further planning and consultation with Council and the RTA will be undertaken to ensure the safe passage of vehicles entering and leaving the site.

### 6.3 STRUCTURAL CAPACITY OF EXISTING ROADS AND STRUCTURES

The existing roads that provide the feasible access to the site are generally in good condition, however the increased traffic during construction has the potential to exacerbate any areas that are showing signs of deterioration. Increased inspection and maintenance will need to be discussed and agreed with the Council.

The major roads have been designed to cater for large overmass vehicles, but some structures on local roads such as cattle grids may be impacted by the passage of the large construction vehicles. These structures may require monitoring and repair or replacement during the construction period to maintain serviceability for local users and construction traffic. A road dilapidation report will be prepared prior to the commencement of construction so any road damage attributable to the construction of the wind farm can be identified and repaired.

### 6.4 DISTURBANCE TO LOCAL COMMUNITY

The main impacts of wind farm construction traffic on the local communities will involve:

- Movements of vehicles through Glen Innes and along the Gwydir Highway to and from the site entry
- Increased frequency of vehicle movements on the former Gwydir Highway alignment that would otherwise have low traffic volumes
- Potential safety risks arising from increased traffic movements

The volume of construction traffic indicated in Table 2 will be spread over the construction period but on a daily basis the frequency of vehicle movements would fluctuate depending on the construction activities occurring at the time. Deliveries of long loads such as the wind turbine blades may involve up to 6 oversize vehicles per day. Pouring concrete for a turbine foundation can involve around 50 one-way truck movements in a day.

The general increase in daily traffic has the potential to increase the short-term traffic noise levels along the proposed access route. The level of disturbance to residents will be directly related to the proximity of the existing premises to the access roads. During construction the timing of vehicle movements will be mostly within the normal site working hours. Night time deliveries will be avoided.

The oversize and overmass vehicles are likely to travel at lower speeds than those normally used by local residents. Some delays may be experienced by local residents due to the nature of the vehicles being used to deliver materials to the site. Special consideration will be provided to routes that pass residential areas, schools, school bus routes and intersections in the transport Management Plan to schedule deliveries outside of peak or important times. Consultation with local stakeholders will be undertaken prior to the finalisation and implementation of the Traffic Management Plan.

### 6.5 ROAD SAFETY

The New England Highway, Gwydir Highway and Glen Innes township all have low accident rates and no fatalities during 2008 as shown in Table 3 below.

Roadway	Fatalities	Injury Crashes	Non Casualty Crashes	Total Crashes
Glen Innes Township	0	6	5	11
Gwydir Highway	0	0	2	2
New England Highway	0	0	2	2
TOTAL	0	6	9	15

**Table 3 – Accident Rates in Glen Innes Area (RTA)**

The transport of large items of equipment on oversize and overmass vehicles as well as an increase in traffic using a road network has the potential to have some impact on road safety. Such potential safety impacts may result from:

- Other road users becoming frustrated by delays behind slow moving vehicles
- Normal traffic expectation by local road users not allowing for the presence of large vehicles
- An increase in traffic numbers on the roads

These potential safety impacts will be minimised by the use of escort vehicles that will accompany the oversize and overmass vehicles. The Traffic Management Plan will be used to control the movement of vehicles between Glen Innes and the site.

## 7. RECOMMENDATIONS AND MITIGATION MEASURES

A number of measures will be incorporated during the construction and operation of the proposed wind farm to ensure that traffic and transport impacts arising from the development are minimised. These measures will be incorporated into a Traffic Management Plan for the project and developed in consultation with the RTA and Glen Innes Severn Council to ensure that applicable safety standards are achieved and disruption to local traffic is minimised.

An important mitigation measure during the construction period will be the implementation of a community information and awareness program. This will ensure that the local residents are fully aware of the planned construction activities and construction traffic. The program will include notices in the local newspapers and newsletters to local residents.

Temporary signage will be erected during the construction period in consultation with the RTA and Council to provide specific warning of construction traffic. Other mitigation measures will include:

- Use of a licensed and experienced haulage contractor, to be responsible for obtaining all necessary permits and approvals from the RTA and Councils and for complying with conditions of consents.
- Escorts for oversize and overmass vehicles will be provided in accordance with RTA requirements.
- Development of a Traffic Management Plan that will identify detail actions such as scheduling of deliveries, managing timing of transport through major centres (Glenn Innes) to avoid peak times (beginning / end of school), consultation activities during haulage activities, designing and implementing modifications to intersections and street furniture and managing the haulage process.
- The traffic Management Plan will establish a procedure to monitor traffic impacts during construction such as noise, dust nuisance and travel timings so adjustments can be made to minimise impacts.
- Improvements to any public roads impacted by the project in consultation with the RTA & Council. The improvements may include upgrades to the intersection at the site entrance, provision of entry/exit lanes and upgrades to gates and cattle grids.
- Re-instating pre-existing conditions after temporary modifications, if required.
- Providing a 24hr telephone contact during construction to enable any issue or concern to be rapidly identified and addressed.
- Prepare a road dilapidation report prior to the commencement of construction and following completion of construction to determine any damage attributable to the project. Any damage would be repaired by the Proponent.
- Should deterioration of roads occur during construction activities, an inspection and maintenance program would be established, if required by the Council
- Implementation of appropriate erosion and sediment control measures for new access tracks within the site
- Implementation of appropriate dust control measures for unsealed tracks within the site



## **8. CONCLUSION**

The operational phase of the wind farm will require low levels of vehicle access to the site via local roads and will have correspondingly little impact on local traffic.

During the construction phase there is potential for temporary impacts on the local traffic. The construction phase is expected to last for 18 – 24 months. In particular the delivery of the overmass and oversize wind turbine equipment components may at times affect the flow of local traffic. Traffic management procedures will be implemented to ensure that the impacts of the oversize vehicles are minimised and safety and protection measures will be implemented to reduce the risks of accidents to an acceptable level.

The proposed access route to site via the New England Highway and the Gwydir Highway, together with the mitigation measures proposed in this report will minimise the impact of traffic impacts during the construction phase and ensure that the road network can be maintained to a satisfactory standard. Considering the high quality of the access roads to the site and the mitigation proposed, likely traffic impacts are considered acceptable and manageable.

A Traffic Management Plan developed and implemented in consultation with the RTA and Council will ensure that any traffic and transport issues arising as a result of the project are appropriately addressed and have minimal impact on the local community and the local environment.