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***CAPITAL WIND FARM
TRAFFIC and TRANSPORT
ISSUES ASSESSMENT***

Prepared for Renewable Power Ventures

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1. Introduction

1.1 Location and Existing Traffic Flows

This report provides an assessment of the traffic and transport issues relevant to the construction and operation of the Capital Wind Farm. It forms an Appendix to the Environmental Impact Statement (EIS) for the project.

The proposed Capital Wind Farm site is located in the Southern Highlands of NSW, about 40 kilometres north east of Canberra and about 35 kilometres south of Goulburn. The nearest towns are Tarago about 10 kilometres north east of the wind farm and Bungendore about 10 kilometres south of the wind farm (see Figure 1). Physically, the wind farm is located on elevated ridges of the Great Dividing Range at approximately 750 metres to 935 metres above sea level. The wind farm will be located on private properties that are primarily used for sheep and cattle grazing.

The closest main road to the wind farm site is the Tarago to Bungendore Road, which passes about 1km to the east of the wind farm site. A 2004 survey of traffic volumes indicated usage of about 550 vehicles per day based on a 2 way count. Other minor roads at the locality have lesser volumes of traffic flow. Taylors Creek Road near the site has a 2005 traffic count of 65 vehicles per day for the eastern end and less than 20 for the northern end. Existing road use is further described in Section 5.

1.2 Description of Development

It is proposed that about 63 wind turbines will be located within three groups and with a substation to be located nearby. The distribution of the turbines is shown in Table 1 below and Figure 4. Figure 2 also shows the access options for access to the site.

Table 1 – Proposed Wind Farm arrangement

Project Element	Project components	Public Road Access
Hammonds Hill Group	29 Turbines	Taylors Creek Road (3.6km west of Tarago to Bungendore Road)
Ellenden Group	17 Turbines	as for Hammonds Hill or Tarago to Bungendore Road (alternative via Currandooley)
Groses Hill Group	17 Turbines	Taylors Creek Road, Western Leg Road
Substation	Large transformer and associated electrical equipment	Tarago to Bungendore Road

The assessment has been based on having a generating capacity of 2.1 MW, a hub height of approximately 80 metres and blades about 44 metres in length. The nacelles will each weigh approximately 60 tonnes.

A 33,000 volt/330,000 volt substation will be located to the south of the Hammonds Hill Group adjacent to an existing 330,000 volt transmission line.

2. Key Issues

The key issues with regard to transport and traffic relate to the potential impacts likely to arise from the additional vehicles accessing the wind farm site during both its construction and operation.

These issues include:

- a) Suitability of existing road layout for the types of vehicles that will need to access the site. Aspects affecting suitability include width of roads, radius of curvature for bends and nature of existing traffic use.
- b) Structural capacity of the existing roads and structures. This particularly applies to the high volumes of traffic during the construction stage which will include many heavy vehicles.
- c) Disturbance to local community. The increase in vehicles accessing the site has potential for disturbance if in close proximity to residences and may also affect existing users of local roads.
- d) Road safety. Any change to traffic conditions can impact road safety and project planning has considered where safety risks may potentially be increased and proposed measures to mitigate these.
- e) On-site access management. On-site management issues relate mainly to minimising the disturbance to environmentally sensitive areas, minimising erosion and sedimentation and limiting the visual impact of the trackworks.

Each of the above issues is dealt with in more detail in Section 6 of this report.

Potential environmental impacts associated with the traffic and transport arising from the project are also discussed in other parts of the Environmental Impact Statement dealing with specific environmental issues.

3. Predicted Traffic and Equipment Transport Requirements

3.1 General

The proposed development will generate considerable additional traffic during the construction phase and a small increase for the operational phase of the works. The volume of additional traffic and the types of vehicles involved are described in the following sections.

3.2 Construction Traffic

Construction traffic will be generated by the delivery of materials and equipment as well as by the construction workforce of about 50 or more persons going to and from the site on a daily basis.

The type of vehicle accessing the site will be dependent upon the equipment or personnel being transported. Due to the size of the turbine equipment being proposed it is expected that many of the delivery vehicles, to transport the individual components, will be “oversize”, “overmass” or both (see Photos 1 & 2). These vehicles will generally be regarded as Restricted Access Vehicles (RAVs) and will require special operating permits to allow them to travel on public roads.

“**Oversize**” vehicles are those over 19 metres in length, 2.5m in width and 4.3m high and will generally require a permit to use public roads. In certain instances these vehicles will also 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.

For the proposed turbine equipment it is expected that road and track widths of 4m to 5m on straight sections will be required. Given that the vehicles delivering the blades will be up to 50m in length, special attention will be required to turning circles and road widths at bends and intersections.

Longitudinal grades on access tracks of less than 8% (4.6°) will generally be required for ease of access, however grades up to 14% (8°) can be negotiated.

Table 2 shows the principal items of material and equipment to be delivered to the site, the estimated quantities of these materials, the number of vehicle movements required for their delivery and the type of vehicle expected to access the site.

The vehicle movements shown in Table 2 will occur over the duration of the construction period that is expected to be approximately 8 months.

3.3 Operational Traffic

The wind farm will be designed to operate automatically but will have a small on-site staff (eight persons) during its operational life for the purpose of inspecting and maintaining the wind farm. Operational staff will be based at the facilities building at the substation and will regularly visit all parts of the wind farm.

During the initial commissioning and “run-in” phase of its operation the wind farm will require attendance by an additional small number of technical and maintenance staff. Any unscheduled maintenance or repairs may also require attendance at site by additional specialist personnel and equipment. TransGrid staff may also periodically visit the substation associated with maintenance of the 330,000 volt section of the substation.

The number of vehicles accessing the site during the commissioning and operation and maintenance periods is considered minimal relative to the volumes of local traffic.

Table 2 – Predicted traffic movements on public roads for transport of equipment and materials to the site

Material	Quantity	One-Way Vehicle Movements	Vehicle Type
Foundation Materials			
Concrete including:	25,600 m ³		Concrete Truck
Cement	5,500 t	280	2,380 Semi Trailer/Truck
Aggregate	14,900 t	990	
Sand	11,300 t	750	
Water	7,200 kl	360	
Reinforcing Steel	2,300 t	130	Semi-trailer
Road and other items			
Road aggregate	22,500 m ³	2,930	Truck
Water for dust control	4 trucks per day	1,080	Truck
Select fill	15,000 m ³	1,050	Truck
Misc Equipment	Nominal	200	Semi-trailer
Misc Materials	Nominal	50	Semi-trailer
Wind Turbine components			
Tower Sections (4 per tower)	252	252	RAV
Nacelles	63	63	RAV
Hubs	63	63	RAV
Blades (3 per turbine) 2/truck	189	95	RAV
Generator Transformers	63	21	RAV
Substation			
Substation Transformer	1	1	RAV
Misc Substation Items	Various	80	Semi-trailer
33kV Transmission Poles	130	44	RAV
Cables and overhead lines			
Underground cables	27 km	100	Semi-trailer
Overhead conductors	51 km	10	Semi-trailer
Site work activities			
Site Establishment	Nominal	10	Semi-trailer
Cranes	2	14	Semi-trailer
Construction Equipment	25	40	Various
Site Disestablishment	Nominal	10	Semi-trailer
Employees Cars	50	9,000	Car / 4WD
Total One-way traffic movements		8,568 Trucks 9,000 Cars	

Note (1): 5,120 one way concrete agitator truck movements (on site) concrete delivery requirements

Note (2): Road aggregate to be supplied from quarry on site

Note (3): Assumes two concrete batch plants (Groses Hill + Ellenden/Hammonds Hill). Therefore, no concrete deliveries on public roads.

4. Transport Alternatives

Due to the nature of the turbine equipment to be delivered to site, a range of delivery options have been considered including road or rail. Previous reviews however have established that transport of the turbines by rail is not feasible due to the vertical and horizontal clearances available on the rail system and given the long loads required to be transported.

As it is likely that the major components of the wind turbine structures (excluding the tower sections) will be imported from overseas the delivery of these items to site will initially be via the main roads from the major ports in either Sydney or Port Kembla.

Both Sydney and Port Kembla have suitable facilities for receiving the wind turbine equipment and the choice of port will be determined by the contractor after negotiation in respect of temporary storage availability and cost. At this stage, Port Kembla would appear to offer the best option.

In the event that Port Kembla is the port used for shipment then the most likely delivery route would be via the Princes Highway (Mount Ousley) and the Picton Road (Main Road 88) to the Hume Freeway. Subject to the necessary permits being obtained, the timing of the deliveries will be the main consideration for transport to the site. It is anticipated that pre-dawn transport to Goulburn and passage through Goulburn at first light prior to peak flows would be a suitable timing for transport of the over size vehicles. The actual timing will be confirmed in association with development of the Project Traffic Management Plan and in accordance with applicable permits.

If the tower sections are produced in Victoria or South Australia they would most likely be transported on the Hume Freeway.

4.1 Overview of Southern Tablelands Road Transport

Road access to the Southern Highlands of NSW is primarily by the Hume Freeway. The Hume Freeway runs from Sydney to Melbourne and has been upgraded over a number of years to form a major freeway linking the two capital cities.

From the Hume Freeway there are three possible access routes to the wind farm site:

1. via Goulburn and the Braidwood Road.
2. via the Federal Highway and the Collector Road, or
3. via Bungendore

Details of these possible access routes are discussed in the following sections.

4.2 Access via Goulburn and Braidwood Road

4.2.1 Exit from Hume Freeway

Transportation of equipment to the site from Sydney, Port Kembla or Melbourne would use the Hume Freeway and could exit through Goulburn via either the north or south well signposted, exit lanes from the freeway. The northern exit is the easier one for long vehicles to negotiate. The southern one involves a roundabout that needs to be passed through to gain access to Goulburn and may be difficult for a vehicle of 50 metres length to negotiate.

4.2.2 Goulburn City

From the north there are a number of options for passing through Goulburn. Key considerations are, where possible, to avoid the main street and utilise streets and intersections that are of sufficient width to allow the transit of the large vehicles involved while minimizing disruption to local Goulburn traffic. Potential transport routes considered are shown on Figure 3.

The former Hume Highway enters the city from the north (Photo 3) where it becomes Lagoon Street. Depending upon the size of the load being transported and the type of transport vehicle being used it may be possible to turn left at either Union Street or Upper Sterne Street (Photo 4) to access Grafton Street which then continues as Sloane Street. Grafton and Sloane Streets run parallel with Goulburn's main street (Auburn St) (Photo 5) and run alongside the railway line. At the southern end of Sloane St the transport route crosses over the railway line onto the Braidwood Road. The bridge across the rail line is a substantial structure that appears to be adequate to handle the proposed traffic involved.

Another option would be to take the equipment through the centre of town before turning left on Clinton Street (Photo 6), and right onto Sloane Street (Photo 7) and crossing over the railway (Photo 8) onto the Braidwood Road.

The City of Goulburn is a major centre for commerce and the township has many commercial businesses on the main road. The road through town was originally very wide but in recent times has incorporated roundabouts and parking areas that have reduced the width of the vehicle carriageway. Accordingly, for access via the northern freeway exit, the use of Grafton and Sloane Streets appears preferable compared to the main street option.

From the south, the route through Goulburn takes the southern most exit from the freeway and then via Hume Street and Cowper Street with a right turn onto Clinton Street (Photo 9) and then uses the same route as that proposed for the northern access that passes directly through town.

The southern route whilst passing some schools and residences would appear to have less impact on the town centre and utilises roads with generally wider carriageways than the northern route. The roundabout at the southern exit from the freeway involves a fairly tight turning circle and could present safety concerns for vehicles exiting the freeway at speed and encountering slow moving transport vehicles. In contrast, the northern exit from the freeway is a single off-road which provides safe egress for large vehicles.

Depending upon the route selected, some existing roundabouts and separation islands may need to be temporarily modified during the delivery phase of the works to allow for the passage of equipment.

Selection of the route through Goulburn will be undertaken in consultation with Goulburn – Mulwaree Council.

4.2.3 Goulburn to the Site

The access to the site from Goulburn uses the Braidwood Road to Tarago (MR79) for a distance of about 35 km. From Tarago the wind farm can be accessed via the Collector and Taylors Creek Roads.

To manage the traffic on the relatively narrow and unsealed Taylors Creek Road it is proposed that long and heavy construction traffic would enter Taylors Creek Road from the north via Collector Road. Except for traffic relating to construction of the northern Grose Hill Group which would exit the site northwards via Collector Road, all such traffic would exit the site southwards along Taylors Creek Road.

4.3 Access via Federal Highway and Collector Road

4.3.1 Exit from Hume Freeway

The access via the Federal Highway utilises the Hume Freeway initially, with traffic taking the Federal Highway exit and travelling on to Collector.

4.3.2 Collector to the Site

The Collector Road (R30, off the Federal Highway) is a local road that leads from Collector in the north west across the Great Dividing Range to the intersection with the Bungendore Road about 3 kilometres south of Tarago.

The Collector Road at its closest point passes about 5km to the north of the wind farm.

The eastern section of the Collector Road has been subject to a number of improvements due to the development of the Woodlawn Mine and more recently the Woodlawn Bioreactor. This section of road is suitable for the type of vehicles that will be used for the delivery of equipment and materials to the site.

The western section of this road is a low use, low standard winding gravel road that would require substantial upgrading to allow this route to be suitable for the transport of equipment to the site. This route via Collector is considered unsuitable at the present time for delivery of equipment to the site and will not be used for the project.

4.4 Access via Bungendore

4.4.1 General

This option is long and indirect and is considered unlikely to be the preferred option by contractors for deliveries to site. Travel through Canberra would also present some problems and is also unlikely to be considered desirable.

4.4.2 Exit form Hume Freeway

Access to Bungendore from the Hume Freeway can be via a number of routes :

- The Federal Highway
- Sutton Road via Gunning exit
- Barton Highway via Yass exit

4.4.3 To Bungendore

Access to Bungendore via the above routes requires travel through Canberra or along the outskirts of the city, linking to the Kings Highway.

Bungendore is a small township and access through the town is restricted. An old bridge immediately north of the town on the Bungendore Road leading to the site is in poor condition and is speed limited, the suitability of this bridge to carry the required loads of the wind farm equipment would need to be reviewed if this route were to be adopted.

4.5 Preferred Access Route to Site

From the above review it is likely that the preferred access to the site will be via Goulburn and the Braidwood Road. The other options are either inferior with regard to road conditions or are longer in length and have the potential to impact on more people, especially with regard to any proposed route through Canberra.

4.6 On-Site Access

For the three distinct groups of turbines and the substation site that make up the wind farm development, access routes are shown in the table below.

Table 3 – Wind Farm Access Routes

Wind Farm Group	Road from which access is gained	Proposed entrance location	Need for entrance works
Hammonds Hill Group	Taylors Creek Road	3.6 km west of Bungendore Rd	Minor entrance works
Ellenden Group	via Hammonds Hill	same entrance as Hammonds Hill Group	
Ellenden Group (alt)	Bungendore Road	7km south of Mt Fairy Rd	No change
Groses Hill Group	Taylors Creek Road - Western Leg Road	Western Leg Road end	Minor road upgrade and entrance works
Substation	Bungendore Road	3km south of Mt Fairy Rd	Minor entrance works

The proposed access locations have been selected to ensure the maximum safety of both existing roads users and those vehicles accessing the wind farm. Sight distances will comply with recommended standards or, where these are impractical, speed restrictions, warning signs and traffic control will be provided to ensure the safety of the intersection. Generally, the intersection geometry will be a 90° 'T' intersection with the main road having preference for through traffic. Each entrance to the site from public roads will be discussed with council and implemented in accordance with any agreed conditions.

Within each turbine group, access to the various ridges will generally be via specially constructed, unsealed access tracks. Small sections of some tracks in areas where steeper grades are required may be sealed to provide safe access and reduce erosion potential. The location of the access tracks will be determined in consultation with the respective landowners and will be sited to provide adequate grades for access by the large construction vehicles. Tracks will be located away from watercourses and minimising the need to clear existing vegetation. Recommendations with regard to the potential impacts on flora and fauna will also be considered when establishing the tracks.

Some access tracks may be temporary for construction access. The rehabilitation of these temporary tracks will be agreed with the individual landowners.

In a few places along the top of the Hammonds Hill/Big Hill ridge track work will need to be located through rock outcrops and woodland to provide access to the tower sites. Where practical the access tracks will be constructed by relocating excavated material to either side of the track to maintain the visual appearance of the ridge line and provide habitat for reptiles.

Stormwater culverts will be constructed where access tracks cross over existing creeks and gullies.

5. Existing Road Use

Both Sydney and Port Kembla ports are within large cities and the surrounding roads have considerable peak traffic flows. Accordingly, it is likely that deliveries from these locations will be timed to avoid the peaks.

The Hume Freeway which will be the main access to the site from the ports or manufacturing / supply facilities carries a significant volume of daily traffic in the form of cars and heavy vehicles.

The old Hume Highway through Goulburn is now primarily used by local traffic and commercial vehicles accessing the town centre. It has moderate levels of use during peak periods.

The Braidwood Road is a rural road providing a link between Goulburn and Braidwood for local, tourist and light commercial traffic. A traffic volume of approximately 1,100 vehicles per day (two way count 2003 survey) has been recorded on this road.

The Bungendore Road is similar to the Braidwood road providing access for local, tourist and light commercial traffic between neighbouring townships. A traffic volume of approximately 550 vehicles per day (two way count 2004 survey) has been recorded on this road. Access points off this road during the construction stage as follows:

- Substation access - about 3km south of the Mt Fairy Road intersection
- Alternative Ellenden Group access - about 7km south of the Mt Fairy Road intersection is an alternative access to the Ellenden Group that uses the existing Currandooley property access track.

The eastern section of the Collector Road is used primarily by trucks travelling between the Tarago waste transfer site (Intermodal) and the Woodlawn Bioreactor. The western section between the Bioreactor and Collector has a low level of usage and provides only local access from the Bungendore Road to the Federal Highway. A traffic volume of approximately 50 vehicles per day (two way count, 2004 survey) has been recorded on the western section of the road.

Taylor's Creek Road is a secondary rural road used primarily by local residents accessing their rural properties. The road is also used by the local school bus during morning and afternoon periods. A traffic survey by Palarang Council in April/May 2005 gave average figures of 65 vehicles per day for the eastern end near the Shire boundary and 19 vehicles per day for the mid section dropping to 16 vehicles per day at Collector Road.

6. Transport Impacts

6.1 General

The main impact of the development 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 those vehicles.

The Hume Freeway between Sydney and Melbourne carries a significant amount of traffic daily. The amount of additional traffic generated by the proposed wind farm development will be negligible but the restricted access vehicles (RAVs) will require escort vehicles. Some minor disruption may be caused by the passage of RAVs where the freeway does not have multiple lanes to provide adequate passing opportunities. This however is a small percentage of the total length of the freeway and with appropriate timing of vehicle movements there should only be a minor impact on the normal flow of traffic.

Notwithstanding the above it is expected that the wind farm development will not have any significant impact on the operations of the Hume Freeway.

The movement of RAVs through Goulburn and along the rural roads has the potential to cause minor disturbance to local users. This matter will be discussed with Goulburn – Mulwaree Council including aspects such as vehicle routes and modifications to existing Goulburn road infrastructure to permit a safe and controlled passage through and around the city. Beyond Goulburn the rural roads have suitable capacity for transportation of wind turbine components to the site.

The following sections outline the factors to be considered for the key issues introduced in Section 2.

6.2 Suitability of Existing Road Layout

Given the nature and volume of the traffic likely to be generated by the development, in particular the RAVs, a key issue is the route for delivery of large items to site to ensure safe access and to mitigate impacts.

The delivery of the blades using 50m long RAVs is likely to be the critical item with respect to the suitability of the existing road geometry with respect to adequate turning circles and road widths.

Prior to construction the contractor will undertake a detailed assessment the transport routes to be used and in particular the access through towns and over bridges. The existence of steep grades, tight curves and restricted sight distances will be assessed in detail.

Movement of vehicles along Taylors Creek Road is considered to be an important area for traffic management to minimise disruption to rural residents during the construction period and a Traffic Management Plan controlling the access of long and heavy vehicles along Taylors Creek Road will be developed. Such access arrangements along Taylors Creek Road are discussed in more detail in Section 7.

Access points to the various turbine groupings from the public roads have been selected to achieve safe access. Detailed planning and consultation with council will be undertaken to ensure the safe passage of vehicles entering and leaving the sites.

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. Some minor country roads that were constructed many years ago are likely to have inferior road pavement materials and any increase in design traffic may negatively impact on the overall performance of the road pavement.

The increased traffic generated by the proposed development by itself is not likely to significantly effect the theoretical design life of the roads. The existing roads however are likely to suffer as a result of the increased traffic's impacts on existing defects over a short period of time. Where the existing road is already showing signs of deterioration such deterioration will likely be accelerated by the increased traffic generated by the construction works and the passage of overmass vehicles.

Whilst major road structures have been designed to cater for large overmass vehicles, it is possible that some minor structures on the local roads may not be adequate for these vehicles. The structural adequacy of railway bridges, creek crossings and drainage culverts will be reviewed prior to the passing of heavy loads.

Taylor's Creek Road is likely to be impacted by the passage of the large construction vehicles and will require monitoring and repair during the construction period to maintain serviceability for local users and construction traffic.

6.4 Disturbance to Local Community (including Road Users)

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

- Movement of the RAVs along local roads
- Increased frequency of vehicle movements on roads that otherwise have low traffic volumes, particularly during intense periods of activity such as concrete pours,
- Increased traffic noise for residences adjacent to Taylor's Creek Road
- Potential safety risks arising from increased traffic, and
- Increased deterioration of road surfaces and need for maintenance works

The movement of RAVs along the local roads, particularly Taylor's Creek Road will be an important traffic management issue. The transport of the turbine blades will require about 95 RAVs of about 50 metres in length. Escorts will be used with RAV vehicles and timing of movements scheduled to minimise their impact. Physical considerations for the long loads include the road width and increased width requirements on bends, and the grades through dips in the road.

The contractor has inspected Taylor's Creek Road and advised the road is suitable for the delivery of equipment using the RAV vehicles. However, they did indicate that trimming of conifers may be required at Taylor's Creek crossing to facilitate negotiation of the crossing.

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 can fluctuate, depending on the construction activities occurring at the time. Deliveries of long loads such as turbine blades may involve up to 5 or 6 RAVs per day. Concreting operations for the individual tower footings can require approximately 70 one-way truck movements over a period of 10 hours. The movement of concrete agitator trucks will be mostly on access tracks on wind farmer properties and distant from neighbouring residences.

Two temporary concrete batch plants will be established to provide concrete to the Grose Hill Group and the Ellenden/Hammonds Hill Groups respectively so that concrete delivered on public roads will be minimised. However, some concrete may be sourced from the Bungendore fixed batching plant, particularly for the substation and southern turbine sites in the early stages of the project.

The use of on-site batch plants is due to the distance from local concrete suppliers to the turbine sites and to reduce the impact of the concreting operations on local traffic movements and neighbours to the wind farm. The on-site batch plants would be located local to where concrete operations are being

undertaken resulting in concrete delivery truck movements predominantly being restricted to the on-site tracks. Whilst delivery of constituent materials will still be required via local roads the number of deliveries will be less than that required for the delivery of concrete produced off-site and can be spread more evenly over time.

The general increase in daily traffic has the potential to increase the short-term traffic noise levels along the proposed access routes. The level of disturbance to residents will be directly related to the proximity of the existing premises to the access roads. As for the construction works, the timing of vehicle movements will be within the site working hours and avoid night time deliveries.

The oversize and overmass vehicles will by their nature travel at lower speeds than those normally used by local residents along the access roads. Some delays may be experienced by residents due to the nature of the vehicles being used to deliver materials to the site. The timing of vehicle movements will be subject to consultation with the respective Councils and as far as possible will seek to minimise disruption to local road users during the construction period.

6.5 Road Safety

The transport of large equipment on oversize and overmass vehicles as well as an increase in traffic using a road network has the potential to impact on road safety.

Access through towns may require the construction traffic to negotiate intersections where traffic will need to be halted for short periods of time.

As discussed above the slow moving nature of large loads also has the potential to impact on road safety. Such potential safety impacts may result from:

- other road users becoming increasingly frustrated by long delays behind slow moving vehicles
- normal traffic expectations by local road users not allowing for the presence of such large vehicles
- an increase in traffic numbers on the roads

However, any potential safety impacts relating to the presence of RAVs will be minimised by the use of escort vehicles that will accompany the RAVs. With the exception of Taylors Creek Road which is predominantly used by residents living along the road, the increase in traffic on local roads will be small. As discussed previously, a Traffic Management Plan will control the traffic movements RAVs and heavy construction traffic along Taylors Creek Road (see Sections 7 and 8).

6.6 On-site Management

The construction of access tracks and equipment laydown areas on site has the potential to cause some environmental impacts. The site layout and arrangement of access tracks have been designed to simplify access and minimise the extent of tracks required.

The on-site management of traffic and the establishment of an access track network should be managed to ensure minimal impact to the environment. The specific issues arising are identified in other parts of the EIS and the project Environmental Management Plan will address this issue.

The basic philosophy to be adopted is to minimise any impact by ensuring that an effective access track network is established and as far as possible restricting access to the defined tracks and avoiding areas of environmental sensitivity. This process will be undertaken in consultation with the landowners.

By clearly defining the access network it will allow plan drainage works to be planned so as to control runoff onto and from affected areas and to install necessary erosion and sediment control measures.

Laydown areas adjacent to the individual wind towers will be required for the temporary storage of equipment and access by delivery and erection vehicles. The extent of these areas will be minimised to reduce their impact on the environment.

Where existing fences and gates are required to be removed for access to the site suitable alternative arrangements will be made with the landowners to safeguard stock.

7. Assessment

The following sections provide an assessment of each part of the proposed transport route for delivery of equipment and materials to the site.

7.1 Port to Goulburn

This part of the transport will be on main roads most likely from Port Kembla or Sydney. Due to the peak traffic volumes at those locations the deliveries will be timed to avoid them. It is likely that the RAVs would leave the port in the early hours of the morning and arrive at Goulburn near daybreak. This timing will encounter the least volume of city traffic and result in least impact.

7.2 Via Goulburn

The township of Goulburn is accessible from the Hume Freeway for vehicles travelling from both Sydney or Melbourne.

Having exited the freeway the roads leading towards the centre of town are in good condition, are very wide and present no perceived problems for the passage of the RAVs.

Access from the north utilising either the main street of Goulburn or the parallel back streets (Grafton / Sloane Streets) would present some difficulties with regard to negotiating corners, roundabouts and traffic islands. The timing of deliveries would also be critical given the volume of local traffic during business hours and peak periods.

Access from the south presents some difficulties at the roundabout exit from the freeway, however access into Goulburn along the old Hume Highway (Hume Street) is relatively good. Like the northern route towards the centre of town, some difficulty with intersections and roundabouts will be experienced and negotiation of these has the potential to impact for a short time on local road users.

Both routes will pass a significant number of residences, shops and schools in their passage through the Goulburn township. Some additional temporary noise will be generated by the passage of these vehicles with the potential to impact on adjacent residents along the proposed routes. However, the impact is expected to be minor. It is proposed that the RAVs will avoid passing through school zones during the morning and afternoon arrival and departure periods.

Having negotiated the main roads through Goulburn the access route crosses the railway line on the southern side of the town and joins the Braidwood Road. The construction contractor will determine whether any modifications are required to existing road islands and signage to permit the safe passage of the large vehicles.

7.3 Braidwood Road to Tarago

Braidwood Road (MR79) is a two lane sealed road in good condition with a general speed limit of 100kph (Photo 10). From Goulburn to Tarago (approx. 36km) the road passes through gently undulating country crossing several water courses.

The road is in good condition with good geometry in keeping with its speed rating.

Approximately 7km south of Goulburn the road passes through Tirranville which has a small primary school fronting the main road. This section of road is speed restricted during school hours and, as for Goulburn, RAV transport will be avoided during the restriction periods.

The road passes through the small settlement of Lake Bathurst approximately 30km from Goulburn. There are a number of properties located adjacent to the road and the road speed is limited to 60kph through this area.

7.4 Tarago Township

The township of Tarago is located at the junction of the Braidwood and Bungendore roads. The township has a number of residences and commercial business premises fronting the main roads as well as a school fronting the Braidwood Road. No RAV vehicles will pass through the school zone during the morning and afternoon speed restricted periods.

The roads through the town should provide adequate clearance for the wind farm traffic however the main intersection will require careful negotiation for RAVs (Photo 11). Similarly the turn out of the main street (Wallace Street) onto the Bungendore Road (Photo 12) will also be subject to traffic control during the passage of the RAVs.

The timing of movements of equipment to site will be selected to minimise impacts on the local residents.

The Bungendore road exits Tarago to the south crossing the Goulburn to Bombala Railway Line (Photo 13). This is an ungated, signal controlled level crossing that has recently been upgraded by placement of concrete pavement adjacent to the rails passing through the crossing.

7.5 Tarago to Taylors Creek Road

South of Tarago the road passes the Collex Intermodal Terminal which provides temporary storage of waste containers offloaded from trains. The containers are subsequently loaded onto trucks for transport to and disposal at the nearby Woodlawn Bioreactor site located about 5km off the Bungendore Road on the east end of the Collector Road.

The Collector Road is in good condition (Photo 14) in keeping with its use for transport of containers to the Bioreactor facility. The turn off onto Taylors Creek Road (Photo 15) is tight and will require modification to allow for the safe passage of the turning oversize wind farm vehicles.

7.6 Taylors Creek Road

Taylors Creek Road is an unsealed road (Photo 16), generally in good condition with adequate geometry for the delivery of equipment to the Groses Hill section of the wind farm. Some minor improvements to sections of the road will be required to permit the access of RAVs.

However, Taylors Creek Road is relatively narrow with poor sight distances at some points for the safe two-way passing of heavy vehicles. In addition, there a number of creek crossings with single lane causeways located in dips into the creek inverts (Photos 17 and 18). The dip south of Taylors Road in particular has poor sight distance.

Therefore, to minimise any potential safety concerns a Traffic Management Plan is proposed for the use of Taylors Ck Road which will prescribe that all RAV and heavy vehicle transport will enter Taylors Creek Road from the northern end via Collector.

Empty RAVs and other heavy vehicles from the Groses Hill Group only will exit the site to the north via Collector Road but all RAVs and heavy vehicles will exit the Ellenden and Hammonds Hill Groups via the southern end of Taylors Creek Road onto the Bungendore Road.

The benefits of this traffic management measure will be:

- except for the 5km section of Taylors Creek Road north of the Western Leg Road intersection where the empty RAVs will exit northwards (and which has good sight distances and passes no

- driveways to houses), all RAVs and large construction vehicles will use Taylors Creek Road in one direction only
- RAV and heavy vehicle deliveries to site will not be required to turn across northbound traffic on the Bungendore Road to turn right into Taylors Creek Road; and
 - At the same intersection RAV and other heavy vehicles will not hold up southbound traffic on Bungendore Road while waiting to turn right in to Taylors Creek Road.

The right hand turn into Collector Road proposed instead already has a turning lane to facilitate safe turning into that road.

Two site entrances off Taylors Creek Road are proposed for access into the site. One will access the Grose Hill Group of turbines from Western Leg Road while the second will access the Hammonds Hill and Ellenden Groups from a point approximately 3.6km west of the intersection of Taylors Creek Road with Bungendore Road as shown on Figure 2 (Photo 19).

A small number of properties along Taylors Creek Road near Grose Hill may be temporarily affected by the direct passage of vehicles accessing the wind farm.

Given the small amount of traffic that uses the northern end of Taylors Creek Road it is not expected that the access to the Grose Hill Group will have any significant impact on the road or the safety of its users.

The Western Leg Road is a lower standard road but is considered adequate for the delivery of the seventeen turbines proposed for the Grose Hill Group of turbines. A batch plant will also be located at the southern end of the Western Leg Road which will require the delivery of materials along the Western Leg section of road. The intersection of Western Leg Road with Taylors Creek Road may require some modification to accommodate long loads (Photo 20).

The central section of Taylors Creek Road between the Hammonds Hill site entrance and the Grose Hill Group (Photos 26 and 27) will be subject to varying levels of construction traffic. Vehicles using this section of road will include the RAVs (southbound only), non-RAV trucks, 4WD vehicles and cars. Larger vehicle such as cranes, concrete agitator trucks and earthmoving vehicles required to travel between the site office near Hammonds Hill and the Grose Hill Group will be required to use the Bungendore Road-Collector Road-Taylors Creek Road (north) route.

Some upgrading and periodic maintenance may be required to improve the suitability of the road for the use by locals and construction traffic and to maintain it through the 8 month construction period. During dry periods and at times of peak construction traffic wetting down of the road on unsealed sections adjacent to residences will be required..

It is not expected that the development of the wind farm and the traffic it generates will have a significant impact on the Bungendore Road or its present and future users. The construction traffic on the Taylors Creek Road will have potential to affect local residents and it is proposed that traffic management measures be implemented to minimise any inconvenience.

7.7 Tarago to the Substation Entrance (Bungendore Road)

The Bungendore Road south of Collector Road (Photo 21) is generally in good condition and has a designated 100kph speed limit. Only a small proportion of the project traffic will continue south of the Collector Road intersection, predominantly to access the substation or to use an alternative access to the Ellenden turbine Group. The proposed entrance to the substation is about 3km to the south of the intersection with the Mt Fairy Road (Photo 22).

The entrance has adequate sight distances and will not be used for the delivery of the long loads such as the wind turbine blades. As such, the entrance will only require minor works to ensure sufficient area for semi trailers to safely leave the Bungendore Road and enter the site.

The on-site track that leads from the road to the substation passes through an area of high conservation status woodland which will be excluded from grazing by the provision of stock proof fencing and cattle grids either side of the fenced area of woodland. No clearing of trees is envisaged for this access but some lopping of overhanging branches may be necessary. A number of creek crossings will be required to access the substation. These crossings may require minor earthworks to provide suitable crossings.

7.8 On-site access

On-site access for all sites will generally be across open paddocks and along the ridge lines on which the turbines are located (see Figure 4).

The selection of the access routes through the properties will be undertaken in consultation with the individual property owners to ensure minimal impact on their day to day operations and to avoid impacts on areas of identified environmental sensitivity.

The access routes will be generally as shown on Figure 2 with minor variations to ensure that the final alignment and grades are satisfactory for the expected movements of large vehicles.

Generally, only minor works will be required in the open paddock areas (Photo 23). These works will include clearing, filling, grading and drainage improvements. Where possible, road improvements will be undertaken using excess fill material from on-site earthwork operations.

The access tracks accessing the higher ridge section of the sites (Photos 24 & 25) will require careful planning to ensure safe access to the site as some steep sections of access track will be required. Strategic siting of these tracks in areas that are less visible to the surrounding roads together with selective placement of any excavated material where the tracks will be more visible will ensure minimal visual impact is achieved.

The siting and location of access tracks will be undertaken with due consideration to existing flora and fauna habitats and areas of identified archaeological sensitivity. The location of these tracks is flexible and can be adjusted to minimise impacts on the existing flora or fauna. Similarly, should any significant archaeology areas be found on the site, the location of access tracks can be adjusted to avoid any sensitive areas. Where required, relevant specialist advice will be sought for the final location of tracks.

The access tracks will be sited to minimise impact on the existing drainage lines so as to minimise the potential for erosion from disturbed areas and to control of stormwater runoff.

The Environmental Management Plan for the site will address these issues and stipulate that only the tracks as established be used for access around the site. This will prevent unrestricted access across the paddocks and will minimise the impacts of the construction traffic.

It is expected that some access tracks will be rehabilitated following the construction period in liaison with the property owner as only limited small vehicle access is likely to be required to each tower during the operational phase of the project.

8. Mitigation Measures

A number of measures will be incorporated during the construction and operation of the wind farm to ensure that transport and traffic impacts arising out of the development are minimised. These measures will be incorporated into a Traffic Management Plan for the project and shall be developed in consultation with the local Councils to ensure that applicable safety standards are achieved.

The access routes for large vehicles have been selected to minimise impacts on local road users and local road safety. The Traffic Management Plan will include measures to control access arrangements by RAVs and heavy vehicles on Taylors Creek Road so that they predominantly use the road in a one-way direction from north to south (with the exception of vehicles exiting the Grose Hill Group).

An important mitigation measure during the construction period will be the implementation of a community information and awareness program. Prior to construction commencing and during the construction period a program shall be initiated to ensure the local residents are fully aware of the construction activities with particular regard being given to construction traffic using local roads to access the various sections of the site. This program will include press releases in the local newspapers and newsletters and individual letter drops to residents along the access routes to the site. Regular project updates will be made and the use of specific updates shall be reviewed during the construction phase on an ongoing basis.

General signposting of the access roads with appropriate heavy vehicle and construction warning signs shall also be undertaken in consultation with local authorities. Specific warning signs will be located adjacent to the entrance to the individual sites to warn existing road users of entering and exiting traffic. The use of day warning notices where signs are activated on a specific day to warn local road users of construction activities will also be considered.

Particular attention can be given to traffic control and warning signs where the geometry of the road dictates that a potential safety issue exists. On-site access will be restricted to defined tracks to ensure minimal environmental impact.

Further mitigation measures will include the following :

- Improvements to access roads as required and in consultation with the Council. Improvements may include widening of sections of road, alteration to road alignments, provision of passing areas / lanes, etc.
- Provision of traffic control personnel where large vehicles are required to execute difficult or potentially unsafe manoeuvres.
- Concurrence with permit requirements for oversize and overmass vehicles including the use of escort vehicles as required.
- Restrictions on the timing of some large equipment and materials deliveries to site to mitigate specific impacts. In particular the following measures will be adopted:
 - restriction of traffic movements to avoid RAVs passing schools at Goulburn, Tirranville and Tarago during the school zone periods and to avoid RAVs on Taylors Creek Road during school bus operating hours,
 - local deliveries to the site during daylight hours only to mitigate safety problems on local roads and to reduce disturbance for residences near to the access roads.
- Confirmation of access track routes in proximity to environmentally sensitive areas to be guided by relevant specialists.
- Establishment of an inspection and maintenance program for the local road access network to ensure condition of roads are maintained in safe state.
- Maintenance program for on-site access tracks to ensure safe access.
- Implementation of a pro-active erosion and sediment control plan for on-site roads and laydown areas.

9. Conclusion

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

However, there is potential for impacting the local traffic during the construction period that may extend over about 8 months. In particular, the delivery of long turbine components such as blades and tower sections that involves oversize vehicles up to 50 metres long may at times affect the flow of traffic on narrow local roads. Traffic management procedures will be implemented to ensure that the impacts of the oversize vehicles are minimised.

Provision of two separate on-site concrete batching plants to service the northern and southern construction areas will minimise the need for movement of concrete trucks on local roads.

By adopting the preferred access route via the Hume Freeway, Goulburn and Tarago and with the implementation of the mitigation measures contained in this report, the traffic impacts during the construction phase can be minimised and road safety on the access road network maintained to the highest standard.

On-site access track routes and construction formations will be subject to controls, documented in the Project Environmental Management Plan, to address the site environmental sensitivities and ensure minimal environmental impact from these works.

Close liaison between Renewable Power Ventures, its contractors and Councils and local residents and the implementation of a Traffic Management Plan will ensure that transport and traffic issues arising out of the proposed development are appropriately addressed and have minimal impact on the local community.

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- Figure 2: Traffic Access
- Figure 3: Goulburn City Transport Route Options
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