Cardno Grogan Richards

Shaping the Future

LAL LAL WIND FARM

YENDON SECTION

Feasibility of haulage routes

10/01/2008
Job No. CG107800

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LAL LAL WIND FARM –YENDON SECTION

FEASIBILITY OF HAULAGE ROUTES

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1. INTRODUCTION

Cardno Grogan Richards was retained by WestWind Energy Pty Ltd to undertake a preliminary review of the possible road connections between the Midland Highway (A300) and the proposed wind farm site located in Elaine and Yendon, south of Ballarat, Victoria.

On 15 November 2007 an on-site meeting was conducted between Cardno Grogan Richards and WestWind Energy representatives where the project and the scope of this report were discussed.

At the meeting WestWind Energy supplied Cardno Grogan Richards with maps and documents outlining the anticipated truck dimensions for delivery of wind farm parts to the site, in addition to requirements for the trucks in terms of turning circles, gradients, longitudinal gradients, and so forth. The Revised Layout of the wind farm was used for this report.

It is understood that Cardno Grogan Richards' scope for this report is to assess the suitability of the "internal" routes within the public road network leading to the final location of the wind turbines as identified in the maps provided by WestWind Energy Pty Ltd.

In the course of preparing this assessment, the subject site and its environs have been inspected and all relevant data collected and analysed.

2. PROPOSED DEVELOPMENT

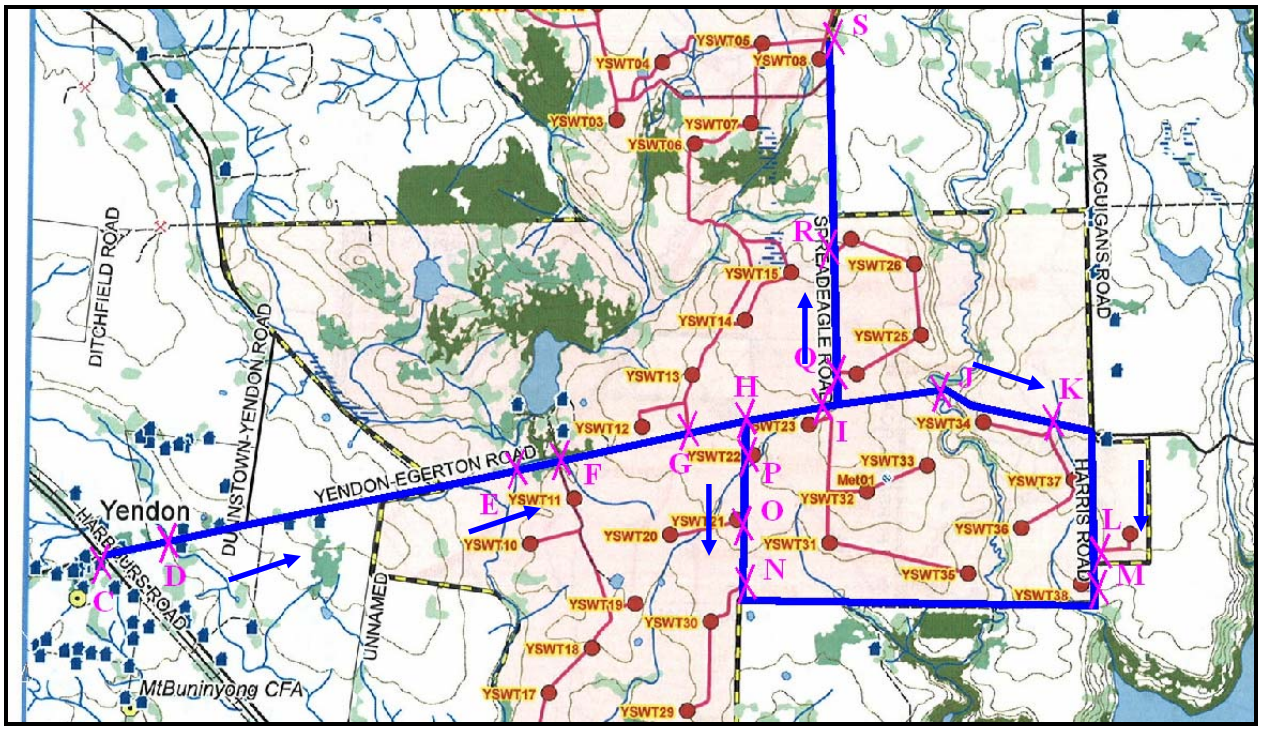
The proposed wind farm is composed of approximately 70 wind turbines to be installed in the 2 distinctive sections; the Yendon Section and the Elaine Section, both located south of Ballarat. The wind turbines will be transported in parts from either Geelong or Portland via the Midland Highway into the Site. This report describes the Yendon Section access routes. For the Elaine Section access routes see report CG107800Rep002F002 dated 12 December 2007.

2.1 Access Routes

Access to both sections of the Site is expected to occur from the Midland Highway. For the purposes for this report Cardno Grogan Richards broke-down both sections into segments from A to V in the case of the Elaine Section and segments A to S for the Yendon Section. The following figures depict the routes that were analysed:

Continues on Figure 2

Figure 1 – Yendon Section - Yendon Road No2 Access Route



Continues Figure 1

Figure 2 - Yendon Section Routes and Points of Interest

3. SITE OBSERVATIONS – YENDON SECTION – THURSDAY 15 NOVEMBER 2007

3.1 Segment A-B (Chainage 0.0 km – 5.5 km)

Sement A-B comprises the route along Yendon No.2 Road between Midland Highway and the intersection of Yendon No.1 Road, Yendon No. 2 Road and Triggs Road.

For the purposes of this analysis the intersection of Yendon No.2 Road and Midland Highway was classified as chainage 0.0 km and distances were measured from this point on an easterly direction towards the Site. Therefore point B (intersection of Yendon No.1 Road, Yendon No.2 Road and Triggs Road) is chainage 5.5 km.

The road is typically of good quality composed of a sealed pavement with crushed rock road shoulders. The pavement width varies between 7 to 10m including road shoulders.

There were signs of wear along the edge of the sealed road and signs in the asphalt indicating that this section of road has been spray sealed a number of times.

Overhanging branches were observed, however, the minimum required clearance of 5.5m has been achieved along this section.

With the exception of the intersection of Yendon No.1 Road, Yendon No.2 Road and Triggs Road (Point B) this section has sufficient clearance for the trucks to access the Site.

Table 1 summarises the observed conditions along this section of road:

Table 1 - Observed Conditions Yendon Section Segment A-B

Chainage (km)	Notes
0.0 – Point A - Midland Highway / Yendon No.2 Road (photos 141 to 147).	- Suitable turning for trucks coming from the south. - Edges of the intersection show signs of deformation
0.1 (photo 153).	- Edge of the sealed road show signs of wear - Several layers of spray seal
0.2	- Overhanging tree >6m
0.3+ (photograph 154)	- Overhanging tree >6m
0.4	- Overhanging tree ≈ 5.3m
0.6+ (photograph155)	- Wide trees may need pruning
0.7+	- Patching and general deterioration road pavement
1.1 (photograph 156)	- Private driveway. - Edge of the seal is deteriorated
1.2 (photo 157)	- Start of guard–rail (road in good condition)
1.8 (photo 158)	- Road has been resealed

2.1 (photo 159)	- Private driveway
2.2 -	- Road width 7.1m including shoulders
2.5 - intersection of Yendon No.2 Road and Hogarths Road (photo 160)	- Intersection starting to fail. Crushed rock has been screwed out
2.8+	- Start wider pavement
3.1	- Pavement narrows
3.4 (photo 161)	- Overhanging tree may need pruning. Clearance ≈ 6m
3.6 (photo 161)	- (photo 161)
3.6+ (photos 162 -163)	- Existing culvert
3.8+ (photo 164)	- n/a
3.9	- Overhanging power cable ≈ 5m
4.0 (photo 165)	- Overhanging tree needs pruning. Clearance ≈ 4.0m
4.9	- Overhanging tree needs pruning. Clearance ≈ 4.0m
5.3	- Road patching
5.5 - Point B - Intersection of Yendon No.2 Road, Yendon No.1 Road and Triggs Road (photo 166-176)	- Problems with turning circle. - Drainage not working causing road to collapse. - Pavement failing and subject to flooding due to inefficient drainage system

3.2 Segment B-C (Chainage 5.5 km – 6.3 km)

Segment B-C comprises the route along Yendon No.2 Road between Triggs Road and the Melbourne-Ballarat railway (level crossing). This short section of road has in years gone by been referred to as “Main Road” but is now called Yendon No.2 Road up until the intersection of Harbours Road where it becomes the Yendon-Egerton Road.

The road is typically of good quality composed of a sealed pavement with crushed rock road shoulders. The pavement width varies between 7 to 10m including road shoulders.

Overhanging trees were present along this section of road, however the main concern is the level crossing were there is an accentuated change of gradient.

Table 2 summarises the observed conditions along this section of road:
Please note that the chainage continues from the original start point on the Midland Highway.

Table 2 - Observed Conditions Yendon Section Segment B-C

Chainage (km)	Notes
5.6 (photo 177)	- 7.5m wide road
6.1 (photo 178)	- Overhanging tree requires pruning. Clearance ≈ 5.0m - Overhead telephone cable. Clearance ≈ 6.0m
6.3 – Point C –Railway Crossing (photos 179-190)	- Survey required to determine road profile including change of grades.

3.3 Segment C-D (Chainage 6.3 km – 6.8 km)

Segment C-D comprises the route along Yendon-Egerton Road between the railway crossing and the bridge over Spring Creek.

The road is generally in good quality and is approximately 7m wide. Signs of 'bleeding' were observed in the asphalt.

Table 3 summarises the observed conditions along this section of road:

Table 3 - Observed Conditions Yendon Section Segment C-D

Chainage (Km)	Notes
6.8 – Point D – Spring Creek (photos 191 - 201)	- Asphalt 'bleeding' through the seal top of the bridge - 3.0m span - 6.9m wide

3.3.1 Bridge Over Spring Creek (Chainage 6.8 km)

From our limited visual inspection, the bridge consists of a single span concrete slab deck, topped with asphalt supported on bluestone abutments.

Information regarding the bridge has been sought from Moorabool Shire Council, however only very limited verbal information has been received.

We understand from Council, and the lack of signage to the contrary, that the bridge does not have a reduced load limit from the current Australian Bridge Design Code (AS 5100 – 2004).

We also understand from our discussions with Council that no maintenance is scheduled for this bridge in either this or next financial year's budget.

It is further understood that trucks with at least twin rear axles that can be assumed to be rated in the order of 12 tonne per axle regularly use the road while transporting material from local quarries.

The bridge width is generally consistent with the road conditions either side of it, providing for one design lane in each direction. It is anticipated that given the width of some of the proposed loads to be transported over the bridge for the wind farm, that other heavy

vehicles should not be permitted to attempt to pass any of the heavily loaded vehicles transporting items to the proposed wind farm development whilst on this bridge. This is standard practice for the pilot vehicles accompanying wide loads.

The worst case loadings for the maximum design vehicle, requested by WestWind Energy to be reviewed for the bridge crossings, consists of 5 axles of up to 12 tonnes per axle. Based on AS 5100 – 2004, it can be assumed that these axles are at a minimum of 1250 mm centres. Therefore a maximum of three axles may be located on the bridge at any one time. This is consistent with the grouping of three axles with a maximum load of 12 tonne per axle at 1250 mm centres that forms the basis of the semi trailer design load.

Based on the assumptions above, it may be assumed that the bridge is probably capable of carrying the vehicles required by WestWind Energy.

However, from our limited visual inspection, we noted that in areas, the mortar between bluestone blocks has been eroded. This appears to have been repaired in some areas, while other areas do not appear to have received attention.

Provided that the assumptions that no other vehicles are on the bridge with the subject vehicle and that the bridge is currently rated to safely have semi trailers pass each other on the bridge, it can be shown that the bridge abutments can carry the load of the design vehicles.

From our inspection, we would also envisage that other mid to long term maintenance works should be encouraged to be undertaken. Examples include, but are not limited to reviewing the condition of the mortar in the abutments, particularly below flood water levels and reviewing the abutment foundation conditions.

3.4 Segment D-E (6.8 km –9.1 km)

Segment D-E comprises the route along Yendon-Egerton Road between the bridge over Spring Creek and the bridge over Lal Lal Creek.

No major issues were identified along this segment of road besides the bridge over Lal Lal Creek.

Table 4 summarises the observed conditions along this segment of road:

Table 4 - Observed Conditions Yendon Section Segment D-E

Chainage (km)	Notes
9.1 – Point E – Lal Lal Creek (photos 202-209)	- 5.2m wide. - 10m span. - Chevron signs to be removed on each side of the bridge in order achieve required clearance

3.4.1 Bridge Over Lal Lal Creek (Chainage 9.1 km)

From our limited visual inspection, the single span bridge consists of a series of five concrete T beams, topped with a concrete deck slab with asphalt over, supported on concrete abutments.

Information regarding the bridge has been sought from Moorabool Shire Council, however only very limited verbal information has been received.

Initial discussions with Council suggested that the bridge was to be replaced within the next year or two. It is now understood that maintenance consisting of concrete patching is scheduled for the 2007-08 financial year, with no maintenance scheduled for next financial year in the Council's budget. Bridge replacement is now understood to not be a priority for Council.

Council advice and the lack of signage to the contrary suggest that the bridge does not have a reduced load limit. Therefore it is assumed that the bridge is capable of safely carrying the design vehicle that applied at the time of the design of the bridge, which is likely to be the equivalent of a semi trailer (T44 design load).

It is further understood that trucks with dog trailers with at least twin rear axles that can be assumed to be rated in the order of 12 tonne per axle regularly use the road while transporting material from local quarries.

The bridge width is generally consistent with a single lane bridge, requiring vehicles travelling in one direction to give way to vehicles travelling in the opposing direction.

The worst case loadings for the maximum design vehicle, requested by WestWind Energy to be reviewed for the bridge crossings, consists of 5 axles of up to 12 tonnes per axle. Based on AS 5100 – 2004, it can be assumed that these axles are at a minimum of 1250 mm centres. Therefore a maximum of five axles spread over 5.0m may be located near the mid-span of the bridge at any one time. This is almost certainly higher than the relevant design loads of the day.

Based on the assumptions above, more detailed reviews of the bridge are required before it can be proven that any portion of the structure is capable of carrying the required loads. Bridge design drawings, computations and construction records would assist in determining the bridge capacity. More readily available information would be the Council inspection reports, conducted regularly to ensure their bridge assets are suitable.

From our limited visual inspection, we noted that previous repairs have been conducted in areas to the concrete T beams. Further repairs to these beams and along the edge of the deck appear necessary.

Provided that the assumptions that no other vehicles are on the bridge at the same time as the subject vehicle, and that the bridge is currently rated to safely carry the design vehicle at the time of the bridges design, it may be possible to show that the bridge abutments can carry the load of the subject vehicles. Therefore, it may be sufficient in the short term to strengthen the bridge deck to allow for the passage of the subject vehicles.

In our opinion, based on observations to date, it is likely that the deck will require some form of temporary or permanent strengthening.

Bridge deck strengthening options have not been investigated at this stage, but may include, among other options:

- A series of two or more rows of props from new footings to the underside of the existing deck to increase the number of spans of the bridge and thus reduce each span to a length where it can only be loaded by a maximum of three axles at a time, or,
- A series of steel beams and concrete deck that sit over the existing deck to take the excess load and transfer the load back to the existing abutments, providing they can be proven to be adequate.

From our inspection, we would also envisage that other mid to long term maintenance works should be encouraged to be undertaken. Examples include, but are not limited to reviewing the founding conditions and the condition of the abutment walls, particularly below flood water levels.

3.5 Segment E-F (9.1 km – 9.6 km)

Segment E-F comprises the route along Yendon-Egerton Road between the bridge over Lal Lal Creek and the gate Y1 which would act as entrance to the Site for access to wind turbines YSWT numbers 11, 10, 19, 18, 17, 27 and 28 (Revised Layout).

No major issues were identified along this segment of road.

Table 5 summarises the observed conditions along this segment of road:

Table 5 - Observed Conditions Yendon Section Segment E-F

Chainage (Km)	Notes
9.6 – Point F – Gate Y1 (photos 210-216)	- Road in good condition. - Road appears to have been reconstructed from Lal Lal Creek (Site E)

3.6 Segment F-G (9.6 km – 10.6+ km)

Segment F-G comprises the route along Yendon-Egerton Road between gate Y1 and gate Y2 which would act as entrance to the Site to provide access to wind turbines YSWT numbers 12, 13, 14, 15, 6 and 7 (Revised Layout).
.
No major issues were identified along this segment of road.

Table 6 summarises the observed conditions along this segment of road:

Table 6 - Observed Conditions Yendon Section Segment F-G

Chainage (Km)	Notes
10.6+ – Point G – Gate Y2 (photos 217-221)	- Road in good condition.

3.7 Segment G-H (10.6+ km – 11.0 km)

Segment G-H comprises the route along Yendon-Egerton Road between gate Y2 and the intersection of Yendon-Egerton Road and Duggans Lane.

No major issues were identified along this segment of road besides turning concern at the intersection of Duggans Lane.

Table 7 summarises the observed conditions along this segment of road:

Table 7 - Observed Conditions Yendon Section Segment G-H

Chainage (Km)	Notes
11.0– Point H – Intersection of Yendon Egerton Road and Duggans Lane (photos 222-228)	- Road in good condition.

3.8 Segment H-I (11.0 km – 11.9 km)

Segment H-I comprises the route along Yendon-Egerton Road between the intersection of Duggans Lane and Spreadeagle Road

The intersection of Spreadeagle Road also represents gate Y3 which would act as entrance to the Site to provide access to wind turbines YSWT numbers 23, 31, 32, 33 and 35 (Revised Layout). This gate is essentially opposite Spreadeagle Road and would use an existing farm gate.
No major issues were identified along this segment of road besides turning concern at the intersection of Spreadeagle Road and the cross-over into gate Y3.

Table 8 summarises the observed conditions along this segment of road:

Table 8 - Observed Conditions Yendon Section Segment H-I

Chainage (km)	Notes
11.8 Gate Y3 (photos 229-232)	- Road in good condition.
11.9 – Point I – Intersection of Spreadeagle Road (photos 232-240)	- Road in good condition.

3.9 Segment I-J (11.9 km – 12.6 km)

Segment I-J comprises the route along Yendon-Egerton Road between the intersection of Spreadeagle Road and the bridge over the Moorabool River West Branch.

The gradients on the approach sides of the Moorabool River are accentuated and it appears this section of road will not be suitable for the required vehicles to travel past this bridge towards the east. This situation is aggravated by sharp curves on the eastern side of the bridge.

Table 9 summarises the observed conditions along this segment of road:

Table 9 -- Observed Conditions Yendon Section Segment I-J

Chainage (Km)	Notes
12.2 (photo 241)	- Road in good condition. End of reconstructed section
12.3 (photo 242)	- Road in good condition. Start descent
12.4 (photo 243)	- Road in good condition.
12.5 (photo 244)	- Poor drainage causing road shoulders to fail
12.6 – Point J (photos 245 – 260)	- 7.3m width - Damaged concrete barrier due to previous crash
Moorabool River West Branch	- 2 span bridge – 9.7m spans, 7.3m wide

3.9.1 Bridge Over Moorabool River West Branch (Chainage 12.6 km)

From our limited visual inspection, the bridge consists of a series of partially exposed steel rails reinforcing a concrete deck with asphalt cover. The bridge has two spans, each of which has two rows of diagonal steel struts to strengthen the main deck. These diagonals appear to have been added after the bridge was originally built. The decks are supported on bluestone abutments and a bluestone central pier. The steel rails appear to be old tramways or trolley car rails, and are coated with rust. The extent of penetration of the rust is not known. It further appears that the current deck may be a replacement for the original deck, as the abutments and central pier show signs of a possible alternative original deck.

Information regarding the bridge has been sought from Moorabool Shire Council, however only very limited verbal information has been received.

We understand from Council and the lack of signage to the contrary, that the bridge does not have a reduced load limit. Therefore we can assume that the bridge is capable of safely carrying the design vehicle from the time of the design of the bridge, which is likely to be the equivalent of a semi trailer.

We understand from our discussions with Council that their budget has allowances for maintenance consisting of painting of the steelwork in the current financial year and concrete patching in the 2008-09 financial year. No mention has been made of the repair or replacement of the guard railing or alterations of the approaches to the bridge.

It is further understood that trucks with dog trailers with at least twin rear axles that can be assumed to be rated in the order of 12 tonne per axle regularly use the road while transporting material from local quarries.

The bridge width is generally consistent with the road conditions either side of it, providing for one design lane in each direction. We would anticipate that, given the width of some of the proposed loads to be transported over the bridge, it can be assumed that another heavy vehicle would not attempt to pass any of the heavily loaded vehicles transporting items to the proposed wind farm development.

The worst case loadings for the maximum design vehicle, requested by WestWind Energy to be reviewed for the bridge crossings, consists of 5 axles of up to 12 tonne per axle. Based on AS 5100 – 2004, it can be assumed that these axles are at a minimum of 1250 mm centres. Therefore a maximum of five axles spread over 5.0m may be located near the mid-span of the bridge at any one time. This is almost certainly higher than the relevant design loads of the day.

Based on the assumptions above, further reviews of the bridge are likely before it can be proven that any portion of the structure is capable of carrying the required loads. Bridge design drawings, computations and construction records would assist in determining the bridge capacity but these are unlikely to be available. More readily available information would be the Council inspection reports, conducted regularly to ensure their bridge assets are suitable.

Provided that the assumptions that, no other vehicles are on the bridge with the subject vehicle, and that the bridge is currently rated to safely carry the design vehicle at the time of design of the bridge, it may be possible to show that the bridge abutments can carry the load of the subject vehicles. Therefore, it may be sufficient in the short term to strengthen the bridge deck to allow for the passage of the subject vehicles.

Bridge deck strengthening options have not been investigated at this stage, but may include, among other options:

- A series of two or more rows of props from new footings to the underside of each span of the existing deck to increase the number of spans of the bridge and thus reduce each span to a length where it can only be loaded by a maximum of three axles at a time, or,
- A series of steel beams and concrete deck that sit over the existing deck to take the excess load and transfer the load back to the existing abutments and piers, providing they can be proven to be adequate to take the additional loads.

From our inspection, we would also envisage that other mid to long term maintenance works should be encouraged to be undertaken. Examples include, but are not limited to removal of rust, reviewing the capacity of the steel struts and reviewing the condition of the mortar, particularly below flood water levels.

Further alternatives worth investigating would be a local short term diversion around the bridge via the provision of a lengthy temporary gravel road and creek crossing on farm land adjacent to and south of the bridge or alternative routes as noted elsewhere in the report.

3.10 Segment J-K (13.4 km- 13.7 km)

Segment J-K comprises the route along Yendon-Egerton Road between the bridge over the Moorabool River and gate Y4 which would act as entrance to the Site to provide access to wind turbines YSWT numbers 34, 37 and 36 (Revised Layout).

The gradients become 'flat' 300m east of the Moorabool River.

Presence of native vegetation along the property boundary

Based on site observation it is recommended to relocate gate Y4 to chainage 13.4 km (approximately) at an existing farm gate.

Table 10 summarises the observed conditions along this segment of road:

Table 10 - Observed Conditions Yendon Section Segment K-L

Chainage (Km)	Notes
13.00 (photo 261)	- End of slope
13.5 (photo 262)	- Overhanging tree needs prunning. Clearance ≈ 4.3m
13.6 (photos 263-264)	- Existing culvert and native vegetation
13.7 –Point K - Gate Y4 (photos 265-274)	- Presence of native vegetation.

3.11 Point K and Intersection of Yendon-Egerton Road / McGuigans Road / Harris Road (13.7 km – 14.1 km)

No issues were observed along this segment of road besides turning circles at the intersection of Yendon-Egerton Road / McGuigans Road / Harris Road.

Table 11 summarises the observed conditions along this segment of road:

Table 11 - - Observed Conditions Yendon Section Segment K – Intersection of Yendon-Egerton Road / McGuigans Road / Harris Road

Chainage (Km)	Notes
14.1 - intersection of Yendon-Egerton Road / McGuigans Road / Harris Road (photos 275-285).	- The drainage at this intersection is deficient subjecting this section to flash flooding and subsequent collapse of the shoulders and the sealed road.

3.12 Yendon-Egerton Road / McGuigans Road / Harris Road and Point L (0.0 km – 0.9+ km)

This segment runs along Harris Road therefore the chainage along Harris Road was restarted to 0.0 km. Point L is at Gate Y5 which would act as entrance to the Site to provide access to wind turbine YSWT 39 (Revised Layout).

Harris Road is approximately 9m wide and is unsealed. It is composed of crushed rocks and is in good condition.

Table 12 summarises the observed conditions along this segment of road:

Table 12 - Observed Conditions Yendon Intersecion of Yendon-Egerton Road / McGuigans Road / Harris Road and Point L

Chainage (Km)	Notes
0.54 (photos 286 - 288)	- Existing culvert. Road in good condition
0.9+ - Site L – Gate Y4 (photos 289 – 295)	- Presence of native vegetation

3.13 Segment L-M (0.9 km – 1.1 km)

This segment continues along Harris Road and the chainage continues from the previous segment.
Point M is at Gate Y6 which would act as entrance to the Site to provide access to wind turbine YSWT 38 (Revised Layout).

No issues found in this segment.

3.14 Segment N-O-P (Duggans Lane 0.0 km – 1.3 km)

This segment runs along Duggans Lane therefore the chainage along Duggans Lane was restarted to 0.0 km at Point N.
Point N is at Gate Y9 which would act as entrance to the Site to provide access to wind turbine YSWT 29 and 30 (Revised Layout).
Point O is at Gate Y8 which would act as entrance to the Site to provide access to wind turbine YSWT 20 and 21 (Revised Layout).
Point P is at Gate Y7 which would act as entrance to the Site to provide access to wind turbine YSWT 22 (Revised Layout).

Duggans Lane is an unsealed road with a width of approximately 11m including the road shoulders. No major issues were found along this segment of road.

Table 13 summarises the observed conditions along this segment of road:

Table 13 - Observed Conditions Yendon Site Section Segment N-O-P

Chainage (Km)	Notes
0.0 – Point N - (photos 297-302)	- Road in good condition
0.5 – Point O – (photo 302-307)	- Road in good condition
0.9 (photos 308-309)	- Existing culvert

3.15 Segment Q-R-S (0.0Km-2.75Km)

This segment runs along Spreadeagle Road therefore the chainage along Spreadeagle Road was restarted to 0.0 km at the intersection with Yendon-Egerton Road.
Point Q is at Gate Y10 which would act as entrance to the Site to provide access to wind turbine YSWT 16, 24, 25 and 26 (Revised Layout).
Point R is at Gate Y11 which would act as entrance to the Site to provide access to wind turbine YSWT 16, 24, 25 and 26 (Revised Layout).
Point S is at Gate Y12 which would act as entrance to the Site to provide access to wind turbine YSWT 5, 8, 9 etc (Revised Layout).

Spreadeagle Road has an average width of 6m including road shoulders.

The usable road width is reduced by roadside native vegetation from Point R to Point S.

Table 14 summarises the observed conditions along this segment of road:

Table 14 - Observed Conditions Yendon Section Segment Q-R-S

Chainage (Km)	Notes
0.25 – Point Q – (photos 343 – 347)	- Road in good condition - Crushed rock access to gate
0.4 (photo 346)	- Large tree narrows access may need pruning
0.7	- Pruning required
1.2 – Point R – (photos 350-351)	- Concerns with native vegetation
2.75 – Point S – (photos 352-355)	- Concerns with native vegetation

4. SUMMARY OF FINDINGS

Based upon the observations made on Thursday 15 November 2007:

- It is considered that Yendon No.2 Road will accommodate truck access adequately up to point J – Lal Lal Creek bridge - if the following areas are treated:
    - Point B - intersection of Yendon No.1 Road, Yendon No.2 Road and Triggs Road – suitable treatment to prepare this intersection to accommodate required turning circle.
    - Point C – Railway Crossing – suitable treatment to reduce change of grade.
    - Point H – intersection of Yendon-Egerton Road and Duggans Lane - suitable treatment to prepare this intersection to accommodate required turning circle.
    - Segment I-J – Intersection of Yendon-Egerton Road and Spreadeagle Road - suitable treatment to prepare this intersection to accommodate required turning circle.
- Segment J-K presents a steep gradient after the bridge together with 1 sharp bend. Further investigation needs to be conducted to ascertain its suitability for required access.
- Segment K-L: Intersection of Yendon-Egerton Road / Harris Road / McGuigans Road - suitable treatment to prepare this intersection to accommodate required turning circle.

5. ALTERNATIVE ROUTES

Figure 3 shows the alternative access routes that were inspected:

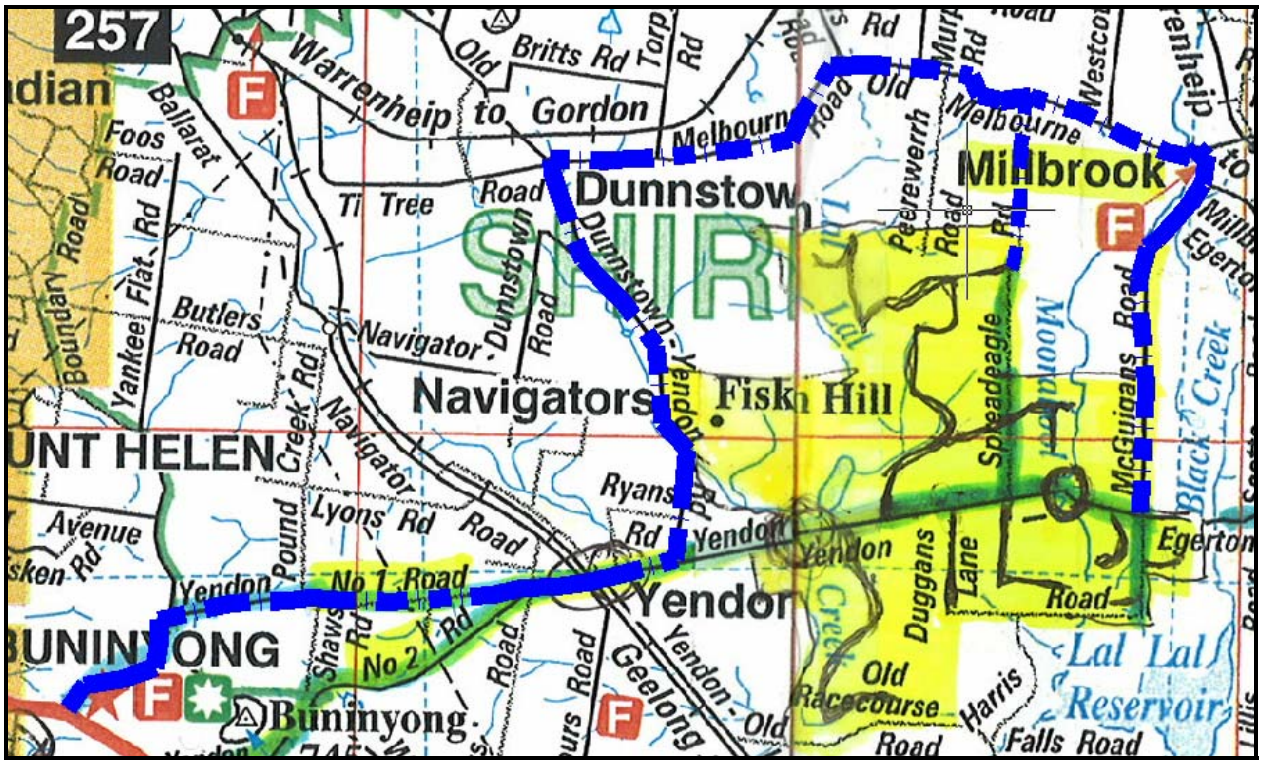


Figure 3 - Alternative Routes Yendon Site

This alternative route was driven on a clock-wise direction therefore all chainages adopted in the following section follow a clock-wise route.

5.1 Yendon No.1 Road

Yendon No.1 Road runs 'parallel' to Yendon No.2 Road, except on the northern side of Mt Buninyong and connects the Midland Highway to the Yendon.

Yendon No.1 Road is not considered an appropriate alternative route due tight bends and steep grades. It is recommended that Yendon No.1 Road be classified as an emergency access route only.

5.2 Dunnstown-Yendon Road

Dunnstown-Yendon Road connects Yendon (see point C on Figure 2 page 2) to Millbrook or to the Western Highway (to the northwest via Warrenheip).

For the purposes of this analysis chainage 0.0 km was assumed at the intersection of Yendon-Egerton Road and Dunnstown-Yendon Road.

Table 15 summarises the observed conditions along this segment of road:

Table 15 - Observed Conditions Dunnstown-Yendon Road

Chainage (km)	Notes
0.0 – Intersection of Yendon-Egerton Road & Dunnstown-Yendon Road (photos 315-317)	- Road in good condition
1.2 (photo 318)	- Over hanging branches need pruning.
1.9-2.0	- Road reconstruction
2.3 (photo 319)	- Pine tree overhanging
5.5 – Roundabout intersection of Dunston-Yendon Road / Ti Tree Road/ Old Melbourne Road (photos 320)	- Road in good condition - Roundabout not suited for the required turning circle.

5.3 Old Melbourne Road

Old Melbourne Road connects Dunnstown to Millbrook and on to the Western Highway via Gordon (further East).

Table 16 - Observed Conditions Old Melbourne Road

Chainage (km)	Notes
3.2 – 3.9 - Two Mile Creek (photos 321-323)	- S bend. - Steep gradient on approach and departure side of the bridge.
4.2 – Intersection Old Melbourne Road/ Lesters Road (photos 324-331)	- Road in good condition -presence of traffic islands
4.2-4.4 (photos 332-334)	- S bend. - Steep gradient approach and departure side of the bridge.
5.5 (photo 335)	- patching to be fixed marked
8.1-8.7 (photo 336)	- West Moorabool River Bridge Road in good condition
8.1 (photo 337)	- Telstra Cable 5m high
8.7	- coarse material on shoulders
8.9 – Intersection of Old Melbourne Road/ McGuigan Road (photos 338-341)	- Road in good condition

5.4 McGuigans Road

No issues where observed along this segment of road. See photo 342

5.5 Summary of findings for alternative route

Based upon the observations made on Thursday 15 November 2007:

- Yendon No.1 Road is not a suitable access to the required trucks due to sharp bends and steep change of gradients. It should be used for emergency access only.

- Dunnstown-Yendon Road intersection of Old Melbourne Road and Ti Tree Road Roundabout is not suited for the required turning circle. Major works altering/removing the roundabout would be required.

- Old Melbourne Road at Two Mile Creek Bridge presents tight curve and steep gradients not suited for the required vehicles.

- McGuigans Road was considered a good alternative option to access point K and L via the township of Millbrook. However, further investigations are necessary to assess the connectivity of the township of Millbrook to the Western Highway (e.g. via Wescotts Road) and the extra mileage required if this route is to be considered.

6. GENERAL CONSIDERATIONS

6.1 Midland Highway A300

The assessment of the suitability of Midland Highway is beyond the scope of this report. VicRoads authorisation must be obtained prior to transporting the wind turbine parts.

6.2 Power Lines and Tesltra Lines

There are a number of locations where lines cross the road networks. Plans will need to be gathered showing the power and telephone network in the area, and the height clearance available at each location. The trucks require a clearance of at least 5.5 metres, and lines may need to be raised to accommodate this.

6.3 Bridges and Crossings

A number of bridge structures are crossed along the roads providing access to the Yendon Section of the Site. These will need to be checked in terms of load bearing capability and width. Some work may need to be carried out to improve these structures before they can be utilised for access to the Site.

Additionally, these bridges are often located within gullies, or dips in the road. Checks will need to be undertaken to ensure that the trucks will be able to negotiate the dips without scraping the road pavement.

6.4 Trees

Trees along the entire route will have to be checked for clearance issues prior to any trucks utilising the roads. A permit will be required to prune or remove any native vegetation along the roads proposed for access to the Site.

6.5 Longitudinal Gradients

Visually checking longitudinal gradients proved difficult on site during the inspection. There are a number of low and high points along the road which will need to be further investigated to ensure that scraping does not occur. Further investigation into this matter will be undertaken during the extended design phase of the project.

7. FURTHER INVESTIGATIONS

The site inspections have indicated that further investigation of the access routes between Lal Lal and Geelong or Portland will be required during the ongoing design process for the proposed wind farm. It is suggested that the following points be considered:

- Survey of Yendon No.2 Road at the following intersections should be undertaken, to provide a reliable base for more detailed investigations:
  - Midland Highway.
  - Intersection of Yendon No.1 Road and Triggs Road.
  - Railway crossing in Yendon.
  - Duggans Lane
  - Spreadeagle Road
  - McGuigans Road
- Swept paths of the relevant trucks accessing the site should be undertaken in order to accurately identify where road widening will need to occur, cut and fill locations, land clearing, and so forth.
- It is likely that a number of local roads will need to be temporarily closed during times when trucks will be accessing the site. A Traffic Management Plan should be prepared prior to the road network being utilised by such large vehicles.
- Liaison with Council and VicRoads to determine appropriate treatments to public roads will need to be undertaken.

APPENDIX A

Photos