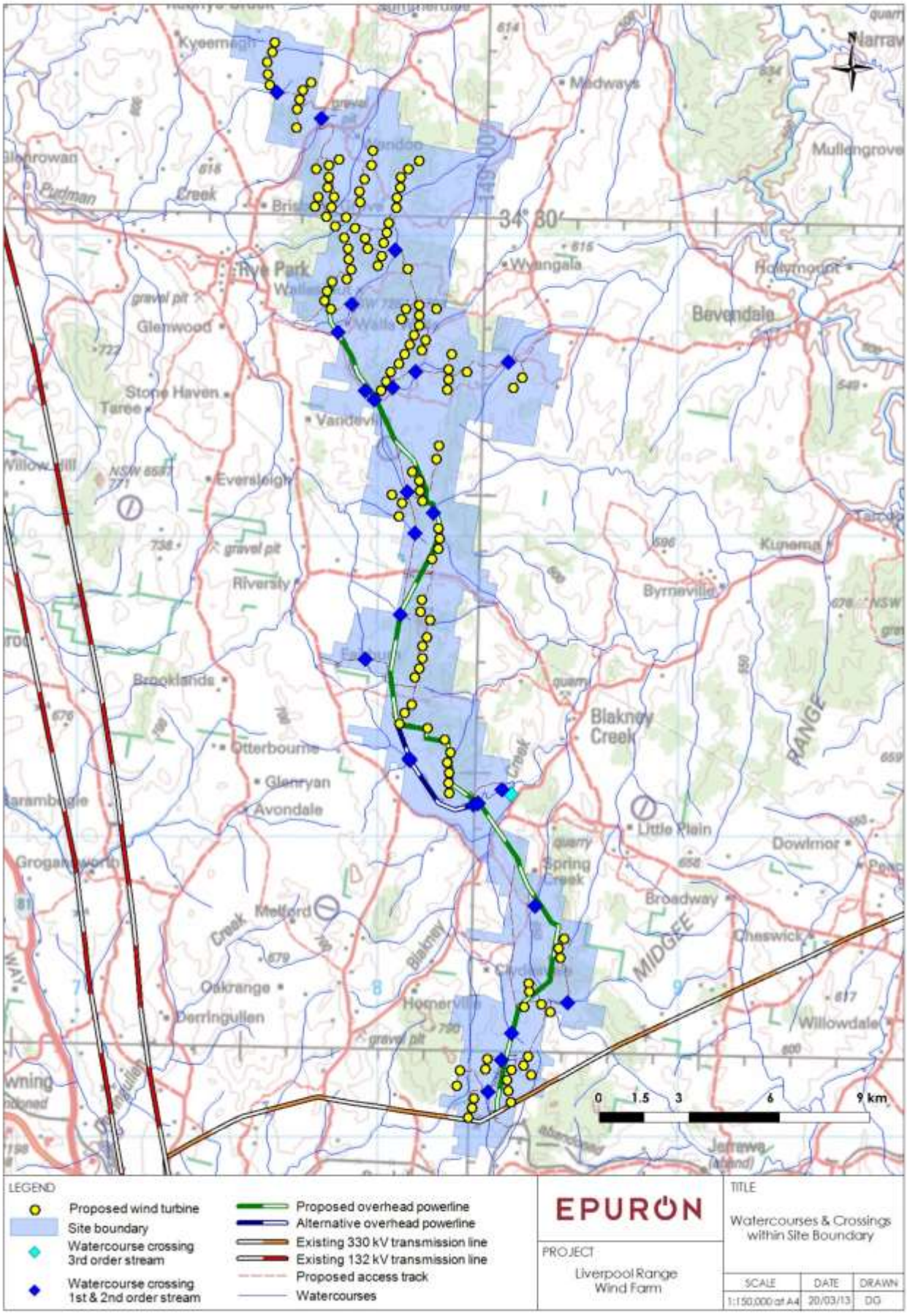


Figure 15-2 Watercourses and crossing locations within the site boundary

Figure 15-3 Blakney Creek watercourse crossing

15.2.3 Groundwater

The Rye Park Wind Farm falls within the Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources which includes rules for protecting the environment, extractions, managing licence holders' water accounts, and water trading in the plan area. The project boundary falls within the Yass Catchment Groundwater Source.

Groundwater flow in Yass Valley Local Government Area is from local groundwater flow systems, mostly within Palaeozoic rocks or Mesozoic intrusives and intermediate flow systems within Precambrian rocks in sedimentary aquifers and some fractured rock aquifers (OCE, 2004).

The total licensed groundwater entitlement for the Yass catchment is 3,181 ML per year, of which 94.7% of this is to be used for irrigation purposes and 5.3% for town water supply purposes (DPI, 2010).

No impact on current groundwater levels or groundwater users is expected from the project primarily due to significant elevation differences between existing groundwater and proposed turbines regardless of whether a gravity type or rock anchor type foundation is used. For the purposes of this groundwater assessment a worst case scenario has been adopted using only rock anchor type foundations to 20m deep. Suitable steps will be taken to ensure construction run-off and oil does not contaminate local groundwater, and local groundwater will not be used as a water supply source for the project. Water supply for project construction will be sourced from local water supply dams and transported to site.

An assessment of groundwater bores within 5 km of the project site indicates groundwater levels are generally located in lower lying country, not on the top of ridges where wind turbines are proposed. The only groundwater bore within the project site boundary is approximately 1.7km west of proposed turbine locations near dwelling R44 (Groundwater number GW058154). Figure 15-4 shows the location of this groundwater bore. This groundwater bore has an elevation of 650m above sea level, and the closest turbines have an elevation of 745m above sea level, an increase of nearly 100m. This groundwater bore is 36.5m deep, with water found at 16.7m deep (NSW Government, National Resource Atlas 2013). As a wind turbine rock anchor type foundation is approximately 20m deep, there is no expected impact on this groundwater bore as there is more than 100m elevation difference between the water level and the proposed turbine.

Figure 15-5 show existing groundwater bores within 5km of the Rye Park Wind Farm project. Of these 43 groundwater bores, the difference between the ground water level and the turbine elevation are all deeper than the 20 metres required for turbine rock anchor type foundations. The closest groundwater bore not within the site boundary is 1.45km from the nearest turbine.

Table 15-1 examines the elevation difference between all 43 groundwater bores within 5km of the Rye Park Wind Farm and the closest turbines, and shows that the Rye Park Wind Farm will not impact, displace or intercept local groundwater. The Rye Park Wind Farm therefore will not impact on existing licenced groundwater users or basic groundwater landholder rights.

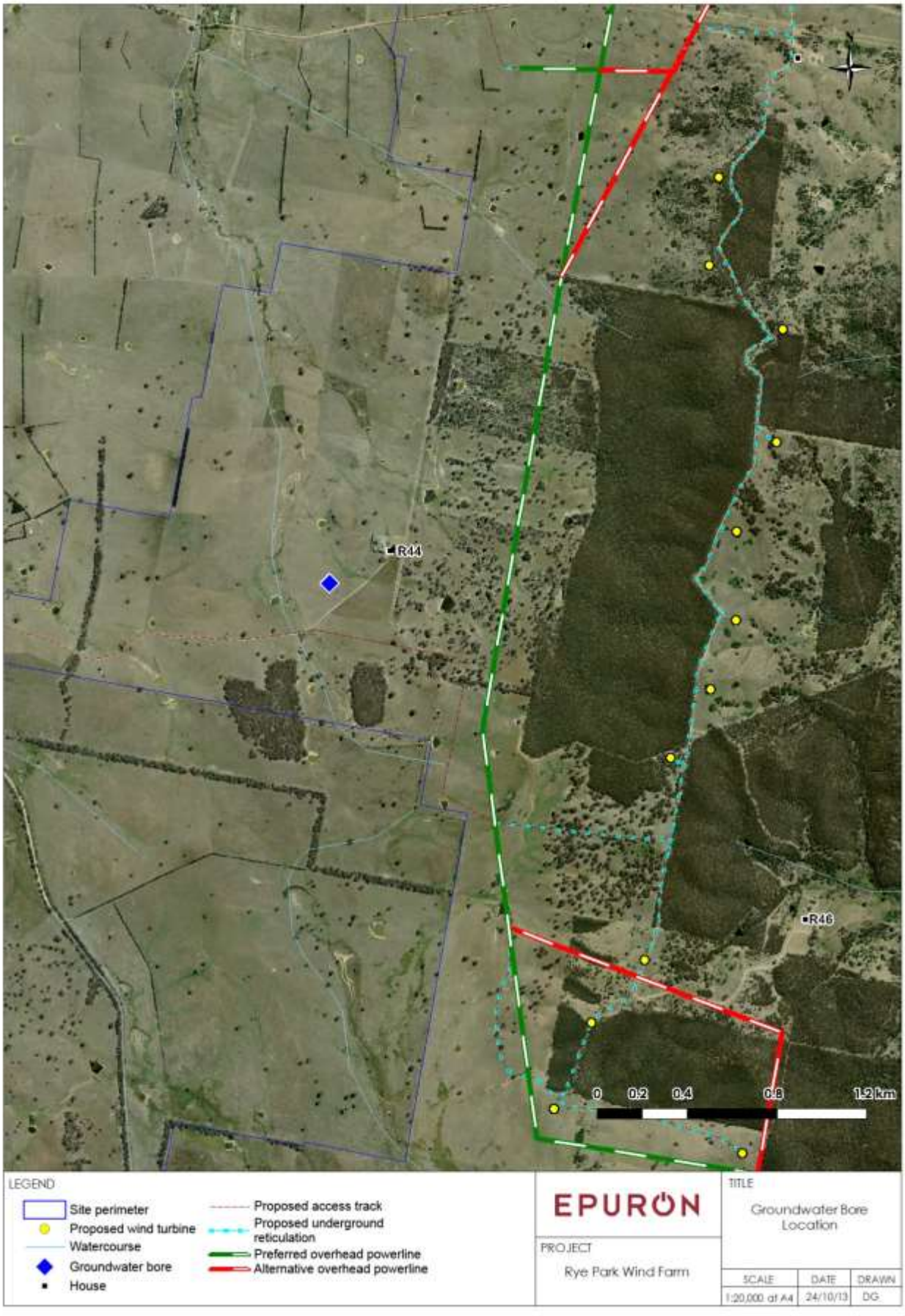


Figure 15-4 Only on-site groundwater bore location

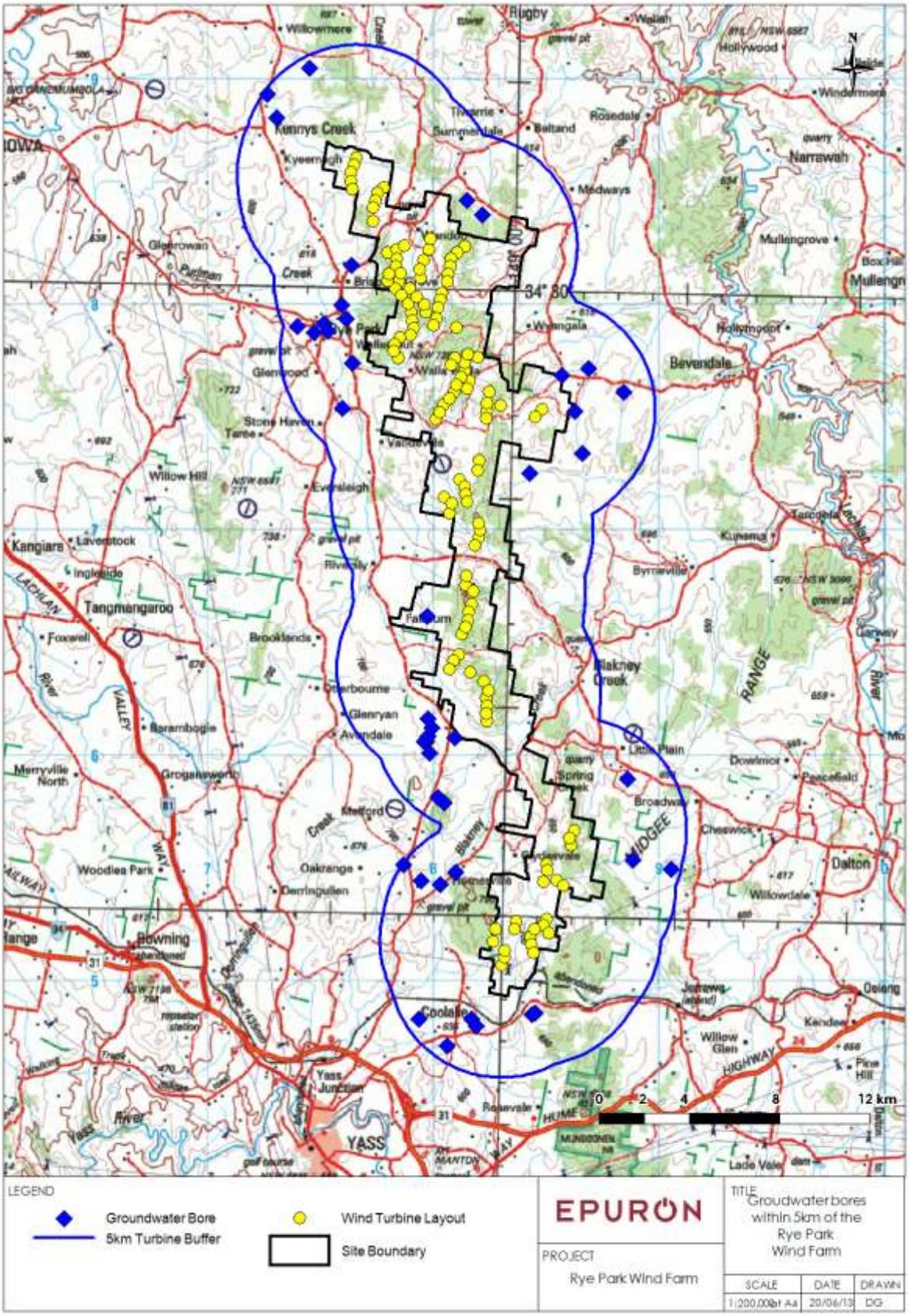


Figure 15-5 Groundwater bores within 5km of the Rye Park Wind Farm

Table 15-1 Groundwater bores within 5km of the Rye Park Wind Farm

Groundwater Bore Number	Completion Date	Final Depth (m)	Water Depth (m)	Ground Elevation of Bore (m)	Ground Elevation of Closest Turbine (m)	Elevation Difference between Water Level & Closest Turbine (20m required for rock anchor type foundation)
GW058154	1/03/1984	36.5	9.7	650	735	94.7
GW092072	23/05/1997	5.7		620	710	N/A
GW703659	5/10/2008	84	44	545	690	189
GW068680		24	3	545	675	133
GW009952	1/03/1952	38.4		560	715	N/A
GW020839	1/04/1952	43	43	615	725	153
GW700800	12/05/1999	61	37	660	725	102
GW092071	23/05/1997	10.1		565	660	N/A
GW092069	22/05/1997	6.2		570	660	N/A
GW092070	22/05/1997	4.2		595	660	N/A
GW702411	28/09/2005	54	49	595	740	194
GW019452	1/05/1955	32		650	740	N/A
GW061024	1/05/1985	18	15	650	750	115
GW414792	5/06/2011	125	27	670	725	82
GW414791	3/06/2011	60	27	675	725	77
GW703858	13/12/2009	60	24	620	695	99
GW070426	1/03/1993	33	27	600	710	137
GW014114	1/02/1959	40.8	12.2	615	710	107.2
GW014115	1/12/1957	41.1		620	710	N/A
GW036760	1/03/1988	102	20	680	695	35
GW040714	1/05/1988	1.2		650	695	N/A
GW036758	2/02/1988	60	41	650	695	86
GW040713	1/05/1988	2.5		645	695	N/A
GW040705	1/05/1988	8.2		635	695	N/A
GW040710	1/05/1988	2.3		635	705	N/A
GW020828	1/07/1953	31.7	7.9	545	665	127.9
GW704117	19/06/2008	66	60	595	715	180
GW020821	1/02/1954	36.6	25.9	600	710	135.9
GW020825	1/02/1954	32.9	13.7	590	710	133.7
GW402891	7/05/2004	60	22	600	710	132

Groundwater Bore Number	*Completion Date*	*Final Depth (m)*	*Water Depth (m)*	*Ground Elevation of Bore (m)*	*Ground Elevation of Closest Turbine (m)*	*Elevation Difference between Water Level & Closest Turbine (20m required for rock anchor type foundation)*
GW404633	11/04/2008	64	22	660	750	112
GW411128	1/01/1999	21		680	750	N/A
GW416102	1/01/2009	110		700	750	N/A
GW704407	27/04/2006	36	27	550	710	187
GW068957	29/10/1991	24	12	545	670	137
GW008870	1/06/1950	22.9	17.1	545	675	147.1
GW034819	1/08/1972	54.8		565	690	N/A
GW700041	3/12/1991	72	59.7	555	690	194.7
GW008902	1/11/1950	26.8	17.4	595	710	132.4
GW033080	1/03/1971	36.6	14.6	620	710	104.6
GW704316	21/06/2008	54		565	660	N/A
GW092067	22/05/1997	6.1		535	660	N/A
GW019370	1/04/1955	26.8	4.9	600	740	144.9

15.3 Construction and Operational Water Requirements

During the construction phase an estimated 8.0 ML of water will be required for general construction purposes including dust control. Locating concrete batching plants on site will require an additional 7.6 ML of water for foundations etc.

Water for the project will be sourced primarily from Yass Dam and stored in onsite tanks. The proponent has discussed the proposed arrangements with Yass Valley Council and has written to Council seeking to progress the necessary arrangements to formalise the use of water during construction.

Sourcing water from Burrinjuck Dam is an alternative to the proposed use of Yass Dam water and will be progressed with the NSW Government, as the water managers, if required.

Once the wind farm is completed and operational it will require only a very small volume of water (less than 1 ML during operations). This water will be obtained through the use of onsite storage tanks collecting water runoff from any of the permanent structures and offsite sources if necessary. Groundwater on the project site will not be used as a source for construction or operational water requirements.

15.4 Assessment

Potential Impacts to Drainage and Hydrology

The construction, operation, maintenance and decommissioning of the project has the potential to impact on the current drainage and hydrological characteristics of the site by:

- installing access roads, on site buildings and other associated infrastructure;
- modifying the landscape with minor-medium earthworks and vegetation clearing;
- altering or disturbing existing watercourses and significant drainage paths if the layout design is amended to include construction in water course areas;
- the pollution of waters by accidental and uncontrolled spills and excavation works;
- sedimentation and erosional transport of pollutants, soils etc. to water courses in the area; and
- unnecessarily traversing or bounding watercourses with access tracks and powerlines in instances where these actions could be avoided.

Any potential impacts are predicted to be most significant during the construction and decommissioning phases, where heavy machinery and vehicles and excavation works are required, large areas of soil and cleared vegetation are exposed, materials are stockpiled and mechanical and construction fluids are stored onsite.

The installation of infrastructure such as foundations, onsite buildings, access tracks, and impermeable hard surfaces can alter and modify the pre-existing flow paths and dynamics of surface and ground water flows as well as impact on the areas general water quality through pollution and sedimentation.

Machinery and on-site storage of fluids and chemicals are another potential source of water pollution and contamination.

The sites altitude is at some of the highest elevations of the Great Dividing Range and forms the divide for water flowing east to the coast and west to the Murray Darling Basin. As the turbines will be located on the highest elevation points within the site area, with the foundations of the turbines only a few metres in depth and all access roads constructed on the surface, it is considered that the development will not encounter or impact on any groundwater reserves. Table 15-1 lists the groundwater levels for all bores within 5km of the Rye Park Wind Farm and compares them to elevation of the closest turbines. The large differences between water level and turbine base elevation means the potential to intercept groundwater is considered minimal to nil.

15.5 Mitigation

The following mitigating measures for minimising disturbance and impacts of the sites drainage and hydrology have either been applied during the design phase or will be applied during construction:

- Minimise the amount and degree to which the general topography and landscape is modified and disturbed by infrastructure and associated works through the design phase.

- Where practical upgrade existing access roads as opposed to constructing new access tracks.
- Where practical, restrict access tracks to follow the site's ridge lines and natural contours while avoiding steep hill slopes and vegetated area.
- Prepare a Sediment/Erosion Control Plan to be incorporated into the CEMP. Soil and water management practices would be developed as set out in Soils and Construction Volume 1 (CSIRO, 2012).
- Infrastructure would not be sited within 40 metres of a major drainage line or water course, where practical.
- As soon as practical, stabilise exposed or clear areas to minimise erosion and sedimentation that can potential pollute and block watercourses in the area.
- Design concrete batch plants to ensure concrete wash would not be subjected to uncontrolled release. Bund areas of the batching plant to contain peak rainfall events and remediate after the completion of the construction phase. Waste sludge would be recovered from the settling pond and used in the production of road base manufactured onsite. The waste material would be taken from the batching plant to be blended in the road base elsewhere onsite.
- A Spill Response Plan would be prepared as part of the CEMP and OEMP.
- Stage excavation works to minimise the amount of exposed areas over time to allow for adequate rehabilitation and reduce the potential for erosion.
- Fuel and oils, materials and soil stockpiles must have designated areas away from any watercourses, with adequate sediment and contamination bunding controls installed to ensure or minimise the impacts of contamination of water sources in the area.
- Watercourse crossings would be designed to be consistent with the 'Guidelines for Controlled Activities on Waterfront Land' as specified by Water NSW[8]. This includes but is not limited to:
    - Identify the full width of the riparian corridor and its functions in the design and construction of crossings,
    - Minimise the design and construction footprint and extent of proposed disturbances within the watercourse and riparian corridor,
    - Maintain existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse,
    - Protect against scour, and,
    - Where possible stabilise and rehabilitate all disturbed areas including topsoiling, revegetation, mulching, weed control and maintenance to adequately restore the integrity of the riparian corridor.

The site plan for the wind turbines and associated infrastructure has been designed with particular emphasis on protecting existing streams and ephemeral watercourses. The layout avoids crossing or interfering with watercourses by any infrastructure. This is to avoid and minimise any adverse impacts to the areas drainage and hydrological regime.

[8] Water NSW. Can be accessed via 'www.water.nsw.gov.auM/ater.Licensing/Approvals/Controlled-activities/default.aspx'

16 General Environmental Assessment

16.1 Soils and Landforms

The project boundary extends from the Rye Park-Dalton Road in the south to the Rye Park-Rugby Road in the north. The surrounding area of Boorowa Volcanics is characterised by undulating low hills and rocky rises on Silurian dacite, crystal tuff, andesite and minor sandstone. The general elevation is 550 to 650m, with peaks to 780m. The soil comprises red and yellow gradational earths, yellow structured loams and thin stony loams within rock outcrops (Mitchell, 2002).

16.1.1 Existing Environment

Geology

The highlands are part of the Lachlan fold belt that runs through the eastern States as a complex series of metamorphosed Ordovician to Devonian sandstones, shales and volcanic rocks intruded by numerous granite bodies and deformed by four episodes of folding, faulting and uplift. The general structural trend in this bioregion is north-south and the topography strongly reflects this. There are four centres of Tertiary basalt flows.

The oldest rocks are a small sliver of the Early Ordovician serpentinite running from Gundagai past Tumut into the lower Snowy Mountains. These unusual rocks were formed in deep marine conditions and were plastered against the edge of Australia when an area of sea floor and an island arc closed up. A similar sequence is found at Lucknow, about 9km south-east of Orange (OEH, 2011b).

The greatest proportion of the site geology is made up of Ordovician & Silurian sedimentary rocks in elevated locations, while Silurian volcanic rocks are found in smaller quantities in the low lying regions. These predominate geological features can be seen in Figure 16-1.

Soils

Soils vary across the bioregion in relation to altitude, temperature and rainfall: on the Palaeozoic slates, sandstones and volcanics, mottled red and yellow texture contrast soils, with red earths found; on the granites, shallow red earths occur on ridges, yellow texture contrast soils on all slopes and deep coarse sands in alluvium; on Tertiary basalts, shallow red-brown to black stony loams exist, with alluvial loams and black clays in swampy valley floors. Limited areas of shallow organic loams are present at high altitude on Canobolas. Some of the tertiary sands in the mid-Shoalhaven deep have been worked into low dunes under a past climate and now have deep siliceous sand or yellow earth profiles (OEH, 2011b).

Topography and Terrain

The South Eastern Highlands Bioregion covers the dissected ranges and plateaus of the Great Dividing Range that are topographically lower than the Australian Alps, which lie to the south-southwest. It extends to the Great Escarpment in the east and to the western slopes of the inland drainage basins.

The site varies from undulating hills with some areas of moderately steep slopes that extend down to small level valleys with numerous saddles and small knolls situated off the main ridgeline. As indicated in Figure 16-2, the site has higher elevations in the northern portion with spot heights in excess of 790 m and slightly decreases in elevation to the south.

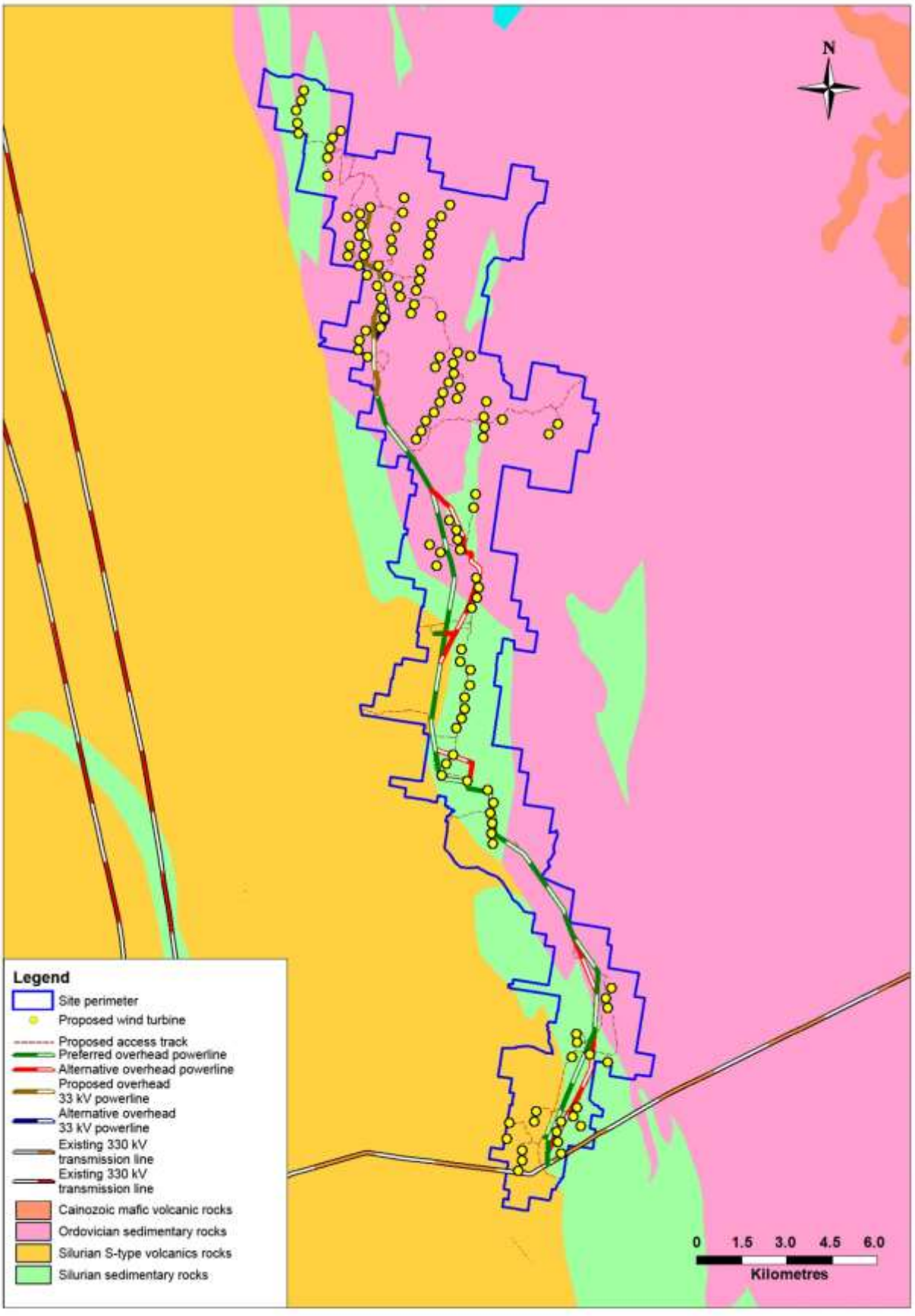


Figure 16-1 Geology of the local area

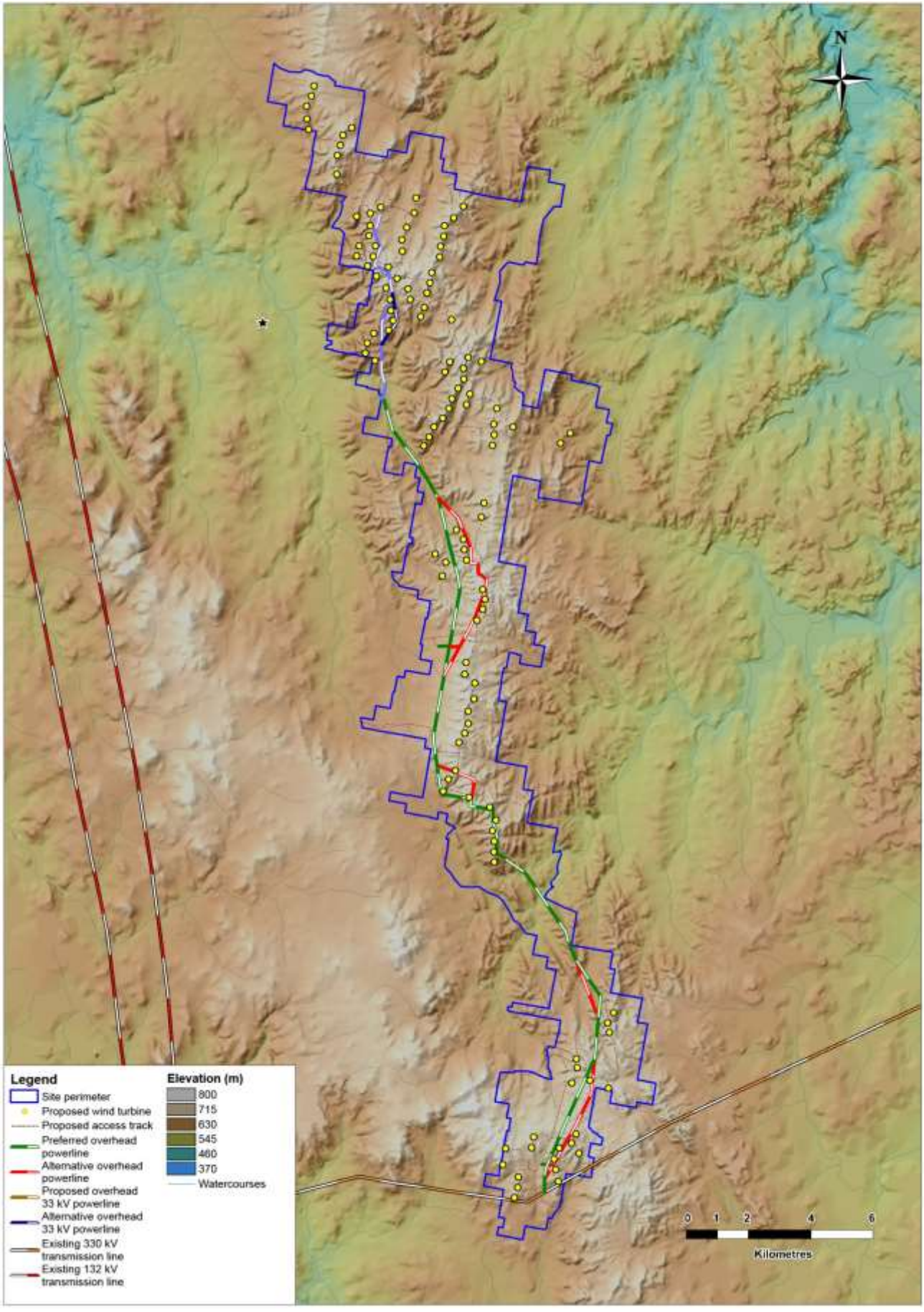


Figure 16-2 Digital Terrain Model of the Rye Park Wind Farm

16.1.2 Assessment

The construction, operation, maintenance and decommissioning of the wind farm has the potential to impact on the current soils and landform of the site. The construction phase and decommissioning phase will impact on the sites landform and soils through:

- vegetation clearing;
- excavation and heavy machinery works;
- grading/levelling;
- access road upgrades;
- possible trenching for powerlines;
- vehicle traffic and heavy machinery traffic;
- excavation for turbine foundation breakdown and site building removal;
- re-contouring the surface; and
- revegetation & rehabilitation works.

These works have the potential to alter and degrade the site's natural soils and landform through increasing the possibilities of:

- erosion and weathering processes;
- introducing and or spreading of weed species
- changing hydrology and drainage paths, which can potentially increase the area's chance of dry land salinity; and
- impact on the ground stability.

Areas at particular risk on the site are areas of steeper slopes and thinner soils. During the design phase, amendments to the infrastructure layout, and in particular access tracks, were made to reduce the overall environmental impact. This meant that access tracks predominantly followed the tops of ridgelines in order to prevent cutting into side slopes. For this reason the project is not expected to cause any significant environmental impacts on the site or its surrounding topography and terrain if standard procedures are undertaken to minimise excavation works and prevent erosion and sedimentation through adequate management and rehabilitation measures.

16.1.3 Mitigation

The extent of ground surface disturbance is expected to be relatively small compared to the total site area. The location of the turbines will be restricted to the ridgelines of the site, with ridges that are generally clear of vegetation. The ridgelines are predominantly on basalt rock just beneath the soil strata making the ridges less prone to erosion risks.

The ridgelines are covered with varying densities of vegetation with the majority of more densely vegetated areas located along the sides of the ridges into the valleys. These slopes are at particular risk of erosion and will therefore be avoided where practical. The surrounding slopes will be largely unaffected by the project, except in the case where powerlines will be routed through them.

Nevertheless, areas will need to be protected by the installation and maintenance of standard erosion and sediment control measures and by minimising the amount of site excavations, land clearing, immediate stabilizing of exposed areas and restricting traffic to access tracks as much as possible. These measures are taken to avoid exacerbating erosion and weathering processes, changing hydrology and drainage paths of the site and contributing to soil and landform degradation.

At the conclusion of the construction period the disturbed areas of the site would be rehabilitated to a level suitable for the ongoing agricultural use of the land. The topsoil removed for construction activities would be stockpiled and reused for the rehabilitation of the areas around the turbine foundations, lay down and hardstand areas and along the access tracks. The concrete batching plants and other areas disturbed by heavy machinery

would be rehabilitated. Pasture grass seed will be used to reinstate the vegetation cover for disturbed areas. The verges of the access tracks would be rehabilitated with topsoil and seed.

The rehabilitation process will be carried out progressively as each section of turbines is established. The rehabilitation of the site to the preconstruction level of vegetation groundcover would be dependent upon the time of year that the works are undertaken.

16.2 Climate and Air Quality

16.2.1 Existing Environment

Climate

The South Eastern Highlands bioregion is dominated by a temperate climate characterised by warm summers and no dry season. Significant areas in the north and south of the bioregion are at higher elevations in a montane climate zone, where summers are much milder.

The climatic characteristics outlined in this section should be regarded as indicative only, as no data has been obtained from the proposed site itself but from weather stations located varying distances from it and at different elevations. The statistics provided in this section are based on historical climate data. Future climate trends may differ over long periods due to the potential influences of climate change.

Table 16-1 South Eastern Highlands climate summary table (OEH, 2011b)

South Eastern Highlands Bioregion - climate variable information	
Mean annual temperature range	6 to 16°C
Minimum monthly temperature range	-3.8 to 4.7°C
Maximum monthly temperature range	18 to 31.3°C
Mean annual rainfall range	460-1883mm
Minimum average monthly rainfall	23-98mm
Maximum average monthly rainfall	55-220mm

Frost and ice are experienced in the colder months and would be taken into consideration when assessing the potential risks of the development.

Air Quality

The site is not located near any major industrial areas; the site is however located close to the Hume Highway which is assumed to receive medium traffic volumes in any period of time. Due to the consistent rainfall in the region and the site's geographical isolation from industry, the area has low levels of airborne particulate pollution. The general vegetation throughout the area will also assist in minimising airborne particles compared to drier, more barren parts of NSW.

16.2.2 Assessment

The project will have minimal impacts on the air quality of the local region and its surrounds due to the development being a low or zero emission form of electricity generation. Activities that are expected to impact on the air quality of the area are predominately associated with the construction, decommissioning and to a lesser extent the maintenance phases. They could include:

- low emissions associated with manufacturing of equipment and materials for the wind farm infrastructure at other locations;
- emissions from transport of equipment and materials to the site;
- operational vehicle emissions; and
- dust generation from excavation and vehicular movement works.

All of these impacts will be relatively minor and can be effectively managed through the implementation of the CEMP.

Wind farms have a positive contribution to reducing total greenhouse gas emissions by providing an alternate source of electricity that is not sourced from fossil fuels.

16.2.3 Mitigation

The CEMP would include measures to ensure that impacts from odour, dust and emissions generated during excavation, road works, and transport of machinery would be adequately controlled through standard industry practices.

The following measures are recommended to reduce the chance of dust and odour issues during the course of the construction, operation and decommissioning phases. These include:

- minimising the surface area that is disturbed at any one time;
- confine vehicle and machinery movement to access tracks or hard stand areas;
- the use of a water truck to minimise windblown dust;
- protect stockpiles from prevailing weather conditions; and
- in the event that remedial measures do not control dust adequately (i.e. prevailing strong winds), work may be suspended as a precautionary measure until conditions are suitable for recommencement.

16.3 Mineral and Petroleum Exploration

Geologically, the area proposed for the Rye Park Wind Farm lies in the Lachlan Fold Belt, an area consisting of a complex series of metamorphosed Ordovician to Devonian sandstones, shales and volcanic rocks intruded by numerous granite bodies and deformed by four episodes of folding, faulting and uplift. Historically, the area has produced significant amounts of many large base metal and gold deposits of economic importance.

There are currently five mineral exploration licenses within the wind farm boundary that have the potential to be impacted as highlighted in Table 16-2.

Table 16-2 Current exploration licences within the project boundary

Licence Number	Holder	Licence Type
EL 6269	Australian Oriental Minerals	Group 1
EL 6274	Tungsten NSW	Group 1
EL 6590	Tungsten NSW	Group 1
EL 7427	Oakland Resources	Group 1
EL 5928	Wallarah Minerals	Group 1

Exploration licenses entitle the holder to carry out exploration and prospecting for minerals within the specified area. As indicated in Figure 16-3, mineral exploration licence boundaries overlap a portion of the site perimeter. All of the previously mentioned licences are for Group 1 minerals (elemental minerals). Licences EL 6269, EL 6274 and EL 6590 all expired during July 2012; however, each of the respective holders has sought renewal of these licences.

Epuron has consulted with these licence holders and provided detailed maps showing the proposed location of wind farm infrastructure. No response has been received at the time of writing.

A review of the Department of Trade and Investment exploration title database showed that there are no current petroleum leases in the vicinity of the Rye Park Wind Farm proposal.

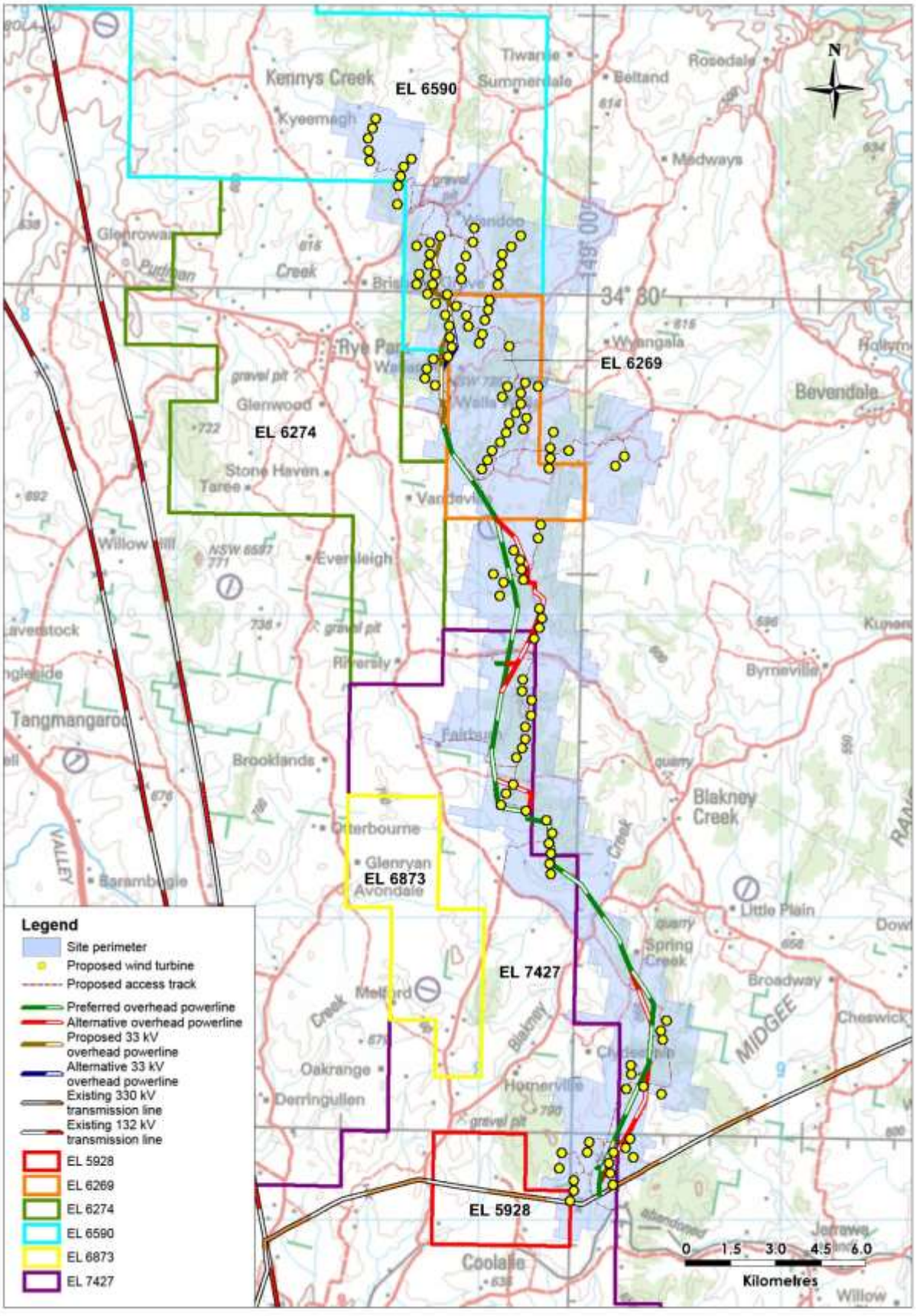


Figure 16-3 Current Mineral Exploration Licenses across the project site

16.3.1 Assessment

There is no reason why the exploration of minerals could not occur concurrently with the operation of wind turbines as the direct footprint of the wind farm infrastructure is only a few per cent of the site area. The project would not prevent access to the site area for ground based exploration of minerals except in the close vicinity of the infrastructure where there may be safety, structural, operational or engineering limitations.

The access tracks constructed for the proposed wind farm would facilitate easier access to a greater portion of the exploration license area. It is possible that the operational wind farm may impede the exploration of minerals within the licensed area close to the infrastructure such as turbines and substations. This may be due to restrictions of the manoeuvrability of exploration machinery, localised sensitivity of magnetic and gravity remote sensing methods and occupational health and safety considerations. In some instances mineral exploration can also be achieved aerially by low flying planes and ground penetrating radar. The operation of the wind farm may limit the use of these methods.

While only five Exploration Licenses occur within the development envelope at this time, if a mineral deposit were discovered then an application for a Mining Lease could be made. There is no certainty that the discovery would be made or a Mining Lease would be granted, or if granted, that mining would be commercially viable. It is likely that the wind farm could impede some mining options (e.g. open-cut) in its immediate vicinity, or that some mine equipment may need to be built in alternate locations. The relatively small land area impacted suggests that alternate mining methods are likely to be available which would prevent sterilisation of any mineral resource. The reversibility of the project suggests that this impact is justifiable. The possible temporary loss of these areas for mining would be offset by the utilisation of a renewable resource during the project's life.

16.3.2 Mitigation Measures

Final wind turbine locations and details of the access tracks and other wind farm infrastructure would be provided to the exploration licence holders prior to construction. Ongoing consultation would be maintained to ensure that the Proponent was aware of any planned exploration activities in the vicinity of the wind farm.

16.4 Economic

16.4.1 Existing environment

The project would be located within the Boorowa, Upper Lachlan and Yass Valley Local Government Areas (LGA). The key statistics pertaining to the LGAs are provided in Table 16-3 (ABS, 2011a; ABS, 2011b; ABS, 2011c).

Table 16-3 Key statistics for the three LGAs

People and Population (2010)	***Boorowa***	***Upper Lachlan***	***Yass Valley***
Area of the LGA (km^2)	2,579	7,128	3,998
Population number	2,478	7,559	15,190
% Growth since 2006	0.86% pa	0.71% pa	2.59% pa
Median age group	45 – 54 years	45 – 54 years	35 – 44 years
Income and Occupation of Local Population (2009)			
Average income	$31,248	$34,691	$46,010
Labourers	19.8%	15.4%	8.6%
Professionals	15.8%	15.1%	16.3%
Tradesperson and related workers	15.5%	13.2%	10.7%
Clerical and administrative workers	11.7%	15.4%	21.0%
Gross value of agricultural commodities (2006)			

People and Population (2010)	Boorowa	Upper Lachlan	Yass Valley
Value of crops	$9.1m	$9.5m	$11.4m
Value of livestock slaughtering	$12.9m	$39.1m	$21.3m
Value of livestock products	$15.4m	$30.4m	$22.3m

The major industries sectors within the region are agriculture, viticulture, tourism and retail (primarily Yass) which reflect the predominantly rural nature of the area. The area supports a wide range of beef cattle, sheep and lambs due to the large area of cleared agricultural land and rainfall levels. The three LGA are also dependent on the input of revenue from tourism. The region features a range of historic buildings, vineyards, national parks and a wide range of colonial heritage attractions.

16.4.2 Assessment

The project would provide temporary employment opportunities during construction and decommissioning. The increased demand for services in the local area, most likely during the construction phase, would also accompany the development, as contractors seek to accommodate and utilise other services in the local area. While it is hard to predict the exact amount of investment that will be injected into the local economy, there have been studies conducted to calculate the likely impacts based on the size of a proposed wind farm. The Clean Energy Council commissioned Sinclair Knight Merz (SKM) to prepare a report into the investment costs and benefits of wind farms in Australia. SKM released the report '*Wind Farm Investment, Employment and Carbon Abatement in Australia*' in June 2012 which presents an updated national and state-based snapshot of wind farm investment, jobs and carbon abatement. The study aimed to use financial and other data from a range of sources to provide a reasonable set of indicative figures to estimate the financial inputs and outputs for wind farms on a per MW basis (SKM, 2012).

Construction

SKM reviewed data based on the expenditure per MW of a number of wind farms that were recently developed or under construction. It found that this review closely reflected the expenditure data from Hallett 1, Waubra and Macarthur wind farms. These figures have been extrapolated for the Rye Park Wind Farm and the results can be seen in Table 16-4.

Table 16-4 Local, State and Australian construction expenditure for a 378 MW wind farm ($million)

Construction Expenditure	Local / Regional	State	Australia
Wind turbine generators	$73.7	$246.5	$366.3
Site administration and design	$9.2	$30.7	$45.7
Site construction works	$9.2	$30.7	$45.7
Site electrical works	$10.4	$34.2	$50.7
Labour	$11.5	$38.0	$56.4
Total construction	$114.0	$380.5	$565.2
Local operational expenses (annual)	$7.7	$11.9	$27.3

Using the estimations from this report, it is anticipated that $104 million could be spent within the region as a result of the construction phase of the wind farm.

There is an opportunity for local contracting and manufacturing services to be contacted during the site development. These may include concreting, earthworks, steel works and electrical cabling, as well as other service-related employment would follow, with the provision of food, fuel, accommodation and other services for the contractors. Based on the construction phase spanning 18-24 months, employment would likely increase by around 369 full time equivalent jobs across the local area. It is considered that construction, property and business services and retail trade would make up most of the employment growth. Precise economic benefits

would vary based on the final site design, turbine suppliers, timing of works and other details. Currently there are no facilities capable of making turbine components (nacelles and blades) in Australia. There may be potential for manufacturing towers in Australia.

There are a number of constraints related to the potential of the socioeconomic environment described. These include supply-side constraints, primarily the supply of labour. Furthermore, the capacity of local business to service new contracts, together with the quality of local housing, amenities and other physical and social infrastructure are also factors that may affect the ability to attract and retain workers. Using the SKM model it is estimated that over $1 million would be spent during the construction period by workers in the local community. Table 16-5 highlights these estimated annual values.

Table 16-5 Estimated local project expenditure within the region

Construction Annual Expenditure	*Local / Regional*
Accommodation	$329,806
Food	$494,692
Fuel	$197,891
Total	$1,022,354

The construction and decommissioning phases of the project would take place over a considerable time period (estimated to the 18-24 month for construction and approximately 12 month for decommissioning). There is potential to adversely impact the current grazing activities on the land parcels that would be developed and for the additional heavy vehicle traffic on public roads to interfere with other economic activities, for example, scenic drives, field days and other tourist related activities. It is anticipated that the grazing impacts would be confined to the involved land holders. Involved land owners would be compensated by the Proponent for allowing the infrastructure to be constructed on the individual properties. It is considered that this compensation would off-set the disruption of grazing.

Operation

Wind farms are an economically viable means to generate electricity. The project would be privately funded and there would be no ongoing financial expenses to the community or any government agency.

Turbine rental provides additional revenue for involved property owners while allowing conventional farming activities to continue as usual. This would create an increased value to these properties and contribute to additional investment in the local area.

Additional benefits include direct investment and job creation in the local area as a result of construction activities. These benefits have been outlined in more detail in Section 4 Strategic Justification. The operational phase of the project is anticipated to create up to 35 annual full time equivalent jobs in the local region for the life of the wind farm.

16.5 Resource Impacts

The project would require natural resources from the Rye Park area in order to construct the foundations, access tracks and required facilities. The following information outlines the resource requirements of the project.

16.5.1 Assessment

Resource requirements for the project would include:

- gravel and base course for access tracks, crane hardstand areas, and site buildings/infrastructure;
- concrete for turbine foundations and site building foundations; and
- water for dust control and concrete.

Rock Crusher

To best utilise any existing natural gravel resources resulting from the construction of the wind farm, a rock crusher would be used on site. Materials excavated during the construction of access tracks or cable trenching and wind turbine footings may, if suitable, be able to be reused as road base for the road surface upgrades. Rock crushing does not trigger Schedule 1 of the Protection of the Environment and Operations Act 1997 if less than 150 tonnes per day is crushed. The daily rock crushing capacity required will be confirmed following a pre-construction geotechnical assessment on the site to determine the extent of suitable construction materials available.

Concrete Batching Plant

It is proposed that two portable concrete batching plants be established on site at identified locations as the preference to sourcing pre-mix concrete supply offsite.

A typical concrete batch plant would involve a level area of approximately 100 x 100 m to locate the loading bays, hoppers, cement and admixture silos, concrete truck loading hardstand, water tank and stockpiles for aggregate and sands. The batching plant would include an in-ground water recycling / first flush pit to prevent dirty water escaping onto the surrounding area, and would be fully remediated after the construction phase.

The concrete batching plant would produce around 400m^3 of concrete per day when a turbine foundation is being poured. The maximum operational period would be the construction period of the wind farm.

Gravel and Road Base Requirements & Supply

Access tracks are generally 5-6 m wide (wider at bends) and approximately 300 – 500 mm in thickness to accommodate the movement of heavy delivery vehicles and cranes. In general all access tracks will be unsealed and constructed from local aggregate. Sealed access tracks will not be used unless safety, geotechnical or economic studies deem them necessary. The final access track design would take into account the traffic loadings and ground conditions relevant to the site and the works.

Sands and aggregate would be sourced from excavation of footings, where possible, or from existing sand and gravel pits within the local area. Clean sands and aggregates would be sourced to prevent transport of weeds to site.

The estimated volume of gravel/road base required for the access tracks and other works is listed in Table 16-6.

Table 16-6 Estimation of road base volumes

Description	*Dimensions*	*Quantity*	*Volume*
Access tracks	5-6 m wide x 400 mm	89,130m	178,260 m^3
Construction compounds	300 m x 300 m x 400 mm	2	72,000 m^3
Hardstand areas	25 m x 45 m x 400 mm	126	57,600 m^3
Total volume			306,960 m^3
Estimated Rock Extracted from Foundations	512 m^3	126	64,512 m^3

Turbine Foundation Concrete Requirements

The turbine foundations will be excavated, with formwork and reinforcement prepared before the concrete foundation is poured. Each turbine foundation will occupy an area of approximately 16 m x 16 m and 2 m deep. Smaller foundations will be used where the geotechnical conditions allow rock anchor style foundations.

Preliminary investigations reveal that all of the required concrete materials can be sourced locally within the Yass region. The estimated materials required for the manufacture of concrete are as follows:

Table 16-7 Concrete materials required

Component	Approximate composition by mass	Required for a single 350m^3 foundation	Required for 126 turbine foundations
Cement	13%	109 tonnes	13,980 tonnes
Sand	34%	286 tonnes	36,608 tonnes
Aggregate	46%	386 tonnes	49,408 tonnes
Water*	7%	59 kL	7,552 kL
TOTAL:	100%	840 tonnes	100,027

*Based on the assumption that water has the density of 1000 kg per m^3

Water Supply

The operational phase of the wind farm will require relatively small volumes of water which will be supplied primarily from rain water collected from facility roof drainage. Should additional water be required, it will be sourced from either Yass Valley or Boorowa Councils and delivered by truck to the site.

It is proposed that concrete for the turbine foundations be either provided from a portable source or purpose-built batching plants (with sufficient capacity to allow an entire foundation to be constructed in one pour). Accordingly, approximately 60kL of water will be needed for each foundation.

Water used in concrete needs to be relatively free of impurities which may adversely react with the cement. As such, water required by construction activities will need to be of a quality commensurate with potable water.

A water truck has a typical capacity of 16 kL. Thus to provide 60 kL to site will require 4 trucks.

It is anticipated that in total 7,552 kL of water would be required for the turbine foundations and 8,000 kL for dust suppression (assuming 2 water trucks per day for 250 days). That equates to a total of about 15,552 kL of water for the construction phase. If this water was entirely sourced from Yass or Boorowa, the number of truck movements required would be 972 in each direction.

The sourcing of treated water would also ensure that no water will be sourced from the local environment. The erosion and sediment control measures will mitigate the potential for the construction and operational aspects of the wind farm impacting on surface water and/or groundwater quality or quantity.

16.6 Property Values

There is a view within some parts of the community that wind farms can adversely affect surrounding property values. Other than wider market conditions, there are a number of contributory factors potentially influencing differences between perceived and actual property values surrounding wind farms. These include its agricultural productivity, personal perceptions, location, allowable land uses, proximity to town centres, lifestyle circumstances and amenity considerations.

In 2009, the NSW Valuer-General released the findings of a study into the potential impacts of wind farms on surrounding land values. The report, “Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia”, assessed eight wind farms located in NSW and Victoria and considered available market data mainly through the analysis of property sale transaction data. The findings of the study found that:

- Wind farms do not appear to have negatively affected surrounding property values in most cases. Forty (40) of the 45 sales investigated did not show any reductions in value. Five (5) properties were found to have lower than expected sale prices (based on a statistical analysis). While these small number of price reductions correlate with the construction of a wind farm further work is needed to confirm the extent to which these were due to the wind farm or if other factors may have been involved;
- Results also suggest that a property’s underlying land use may affect the property’s sensitivity to price impacts. No reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm;

- The results for rural residential properties (commonly known as 'lifestyle properties') were mixed and inconsistent; there were some possible reductions in sale prices identified in some locations alongside properties whose values appeared not to have been affected. Consequently, no firm conclusions can be drawn on lifestyle properties;
- Overall, the inconclusive nature of the results is consistent with other studies that have also considered the potential impact of wind farms on property values; and
- Further analysis (with additional data and expansion of the study area to other states) may yield more comprehensive results. Notwithstanding this, further studies are also likely to be limited by the availability of sales transaction data.

The Valuer Generals study also considered previous studies which have analysed property sales transaction data relating to other local and international wind farms. The studies vary in size and methodology. While some studies have found slight negative impacts, the larger more comprehensive studies have generally found no statistical evidence of reductions in value associated with the development of a wind farm.

In 2007, a NSW Land and Environment Court decision found that property value impacts are not relevant considerations in the assessment of wind farms (or any other development). In Taralga Landscape Guardians v. Minister for Planning and RES Southern Cross Pty Ltd, in considering a request for compensation of nearby landowners in relation to a potential reduction in property value, Chief Justice Preston found that:

- *If the concept of blight and compensation, as pressed by the Guardians, were to be applied to this private property (a proposition which I reject) than any otherwise compliant private project which had some impact in lowering the amenity of another property (although not so great to warrant refusal on general planning grounds when tested against the criteria in S79C of the Act) would be exposed to such a claim.*
- *Creating such a right for compensation would strike at the basis of the conventional framework of land use planning but would also be contrary to the relevant objective of the Act, in S5(a)(ii) for "the promotion and co-ordination of the orderly and economic use and development of land.*

Furthermore, a specific individual case for a property neighbouring a proposed wind farm in South Gippsland Shire has recently been put forward as supporting decreased property values. It appears however from public statements made by the Shire CEO that this individual case had specific circumstances around historic premium lifestyle land value compared to neighbouring properties and the agreed rate reduction was based on proximity of proposed temporary construction infrastructure (concrete batching plant), which may only attract a lower rate during the wind farm construction period only.

16.7 Cumulative Impacts

16.7.1 Existing Environment

The Yass region of the Southern Tablelands has been identified as a suitable location for the development of wind farms to generate renewable energy for the State of New South Wales. A number of companies are active in the region and have identified suitable sites for the development of wind farms. The State Government has also recognised this potential and has established six Renewable Energy Precincts, with the Yass region nominated in one of these precincts (Precinct 4: ACT/NSW Border West Precinct), as being an appropriate area for the development of wind farms.

In the context of this project, cumulative impacts can generally be defined as *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions".*

When a number of large infrastructure projects, such as wind farms, are proposed or constructed proximate to each other, there is a potential for the impacts of one project to combine with the impacts of another project to create greater collective impacts than one project on its own.

For the Rye Park wind farm an assessment of potential cumulative impacts contemplated development of the proposed Bango, Rugby, Yass Valley and Conroys Gap wind farms, and, potential cumulative impacts arising from

noise, visual, traffic, ecology and heritage effects were assessed against these proposed wind farms. A locality map of proposed wind farm projects in the Yass region is shown below;

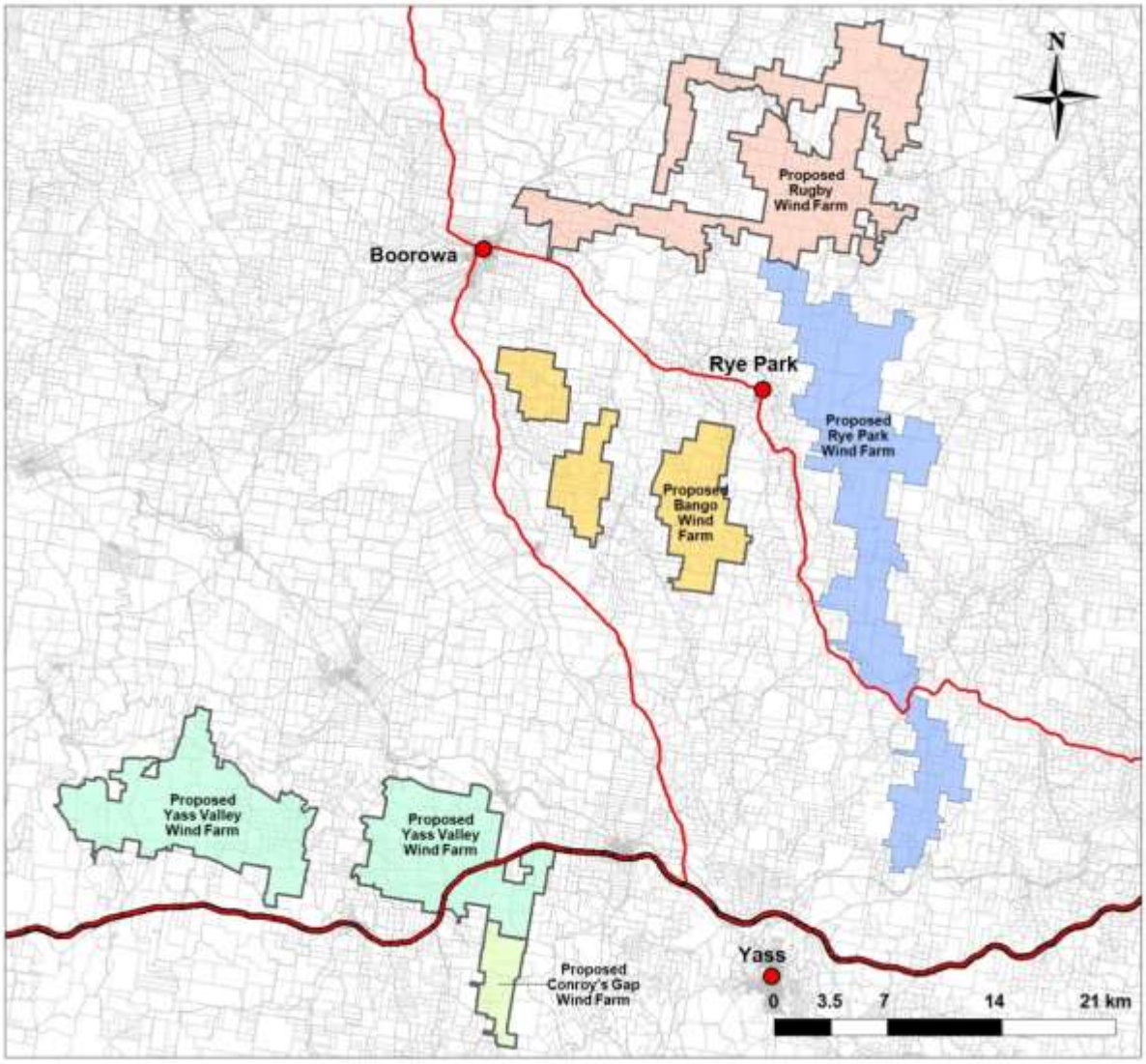


Figure 16-4 Proposed wind farms in the Yass region

16.7.2 Assessment

Impact Considerations

It is generally acknowledged by the wind industry and the various determining authorities that there are inherent difficulties associated with the assessment of cumulative impacts for wind farms. For the Rye Park wind farm it is difficult to undertake an accurate assessment of cumulative impacts as there is limited information available about other proposed wind farms nearby, let alone their expected final form and whether or not they will actually proceed to construction. It is not unusual for an approved wind farm to remain idle for several years before construction commences, if ever. A decision to not approve a particular wind farm based on perceived unacceptable cumulative impacts of it together with another nearby wind farm relies on the certainty that the adjoining wind farm would proceed to be constructed. Established planning practice does not allow for the development of a project, such as a wind farm, to be conditional on the abandonment of another project.

The potential for cumulative impacts to arise out of a number of nearby projects is dependent on the type of impact being assessed and the proximity of projects to each other relative to that impact. For example, shadow

flicker is a particularly localised impact, and for cumulative impacts to occur it would require that two wind farms are very closely situated, relative to an identified dwelling, with a specific aspect of the sun and turbines. Ecology impacts, however, are usually more regional in that a large number of wind farms in a given region may give rise to impacts such as threatened species that depend on the wider region for habitat. Similarly, visual impacts of a wind farm can extend many kilometres and, when viewed in conjunction with another wind farm nearby, can result in a cumulative impact.

As shown in Figure 16-4 there are five known wind farms, including Rye Park, proposed in the immediate Yass region. With the exception of Conroys Gap the proposed wind farms are at various stages of development and have not yet been approved. The Conroys Gap wind farm has been approved and is planning to proceed to construction in the near future. The Bango and Rugby wind farm proposals are situated relatively close to the Rye Park wind farm (within a few kilometres) while the Yass Valley and Conroys Gap wind farms are approximately 20 kilometres away and have limited potential to contribute cumulative impacts.

Noise

The SA EPA guidelines have been widely described as one of the most stringent assessment approaches in the World. The baseline criterion of 35dBA is at least 5dBA less than the New Zealand Standard used in Victoria and 10dBA less than the WHO recommendation for the prevention of sleep disturbance effects. Due to their stringency, the SA Guidelines explicitly account for the cumulative effect of other wind farms. This baseline criterion specified by the SA EPA guidelines accounts for cumulative impacts according to the following:

> *"This base noise level is typically 5dB(A) lower than the level considered to reflect the amenity of the receiving environment. Designing new developments at a lower level accounts for the cumulative effect of noise from other similar development and for the increased sensitivity of receiver to a new noise source."*

In addition the background noise monitoring carried out for the purpose of the assessment is not impacted by an existing wind farm and is thus in accordance with the SA EPA guidelines that state:

> *"Separate wind farm developments in close proximity to each other may impact on the same relevant receiver. Therefore, as for staged development, any additional wind farm that may impact on the same relevant receiver as an existing wind farm should meet the criteria using the background noise levels as they existed before the original wind farm site development. The noise generated by existing WTGs from another wind farm should not be considered as part of the background noise in determining criteria for subsequent development"*

Despite none of the wind farms having a confirmed layout, turbine selection or approval/construction go ahead a preliminary evaluation has been made on the cumulative impacts and compliance.

There are three wind farms currently in development in the vicinity of Rye Park Wind Farm: Rugby Wind Farm, Bango Wind Farm, and Yass Valley Wind Farm. There is one approved wind farm in the vicinity, Conroy's Gap Wind Farm. The cumulative impact of both Yass Valley Wind Farm and Conroy's Gap Wind Farm on noise levels will be negligible as they are over 20km from Rye Park Wind Farm.

Both Bango Wind Farm and Rugby Wind Farm are not yet approved and are currently in the development process. As such final turbine locations and turbine models have yet to be chosen and confirmed. The cumulative noise impact has been modelled using both wind farms based on available public data.

The impact of Bango Wind Farm on dwellings assessed in the NIA in Appendix B is likely negligible. The cumulative noise levels are likely to meet the compliance criteria at all dwellings assessed in the NIA in Appendix B.

The preliminary cumulative impact of Rugby Wind Farm on noise levels is predicted to only marginally increase the predicted noise levels at some receivers. The likely cumulative noise level at each dwelling still meets the relevant compliance criteria.

The small increase in noise levels due to cumulative impact from both Bango and Rugby is due to:

- the distance of the adjacent wind farms to Rye Park Wind Farm
- the dominant contribution of predicted noise levels is from Rye Park Wind Farm turbines itself.

A more detailed explanation is detailed below. It is important to emphasise that all modelling has been conducted based on a worst case model and is considered conservative (ISO9613-2).

A further factor to consider is the operational timing of the wind farms. If Rye Park Wind Farm begins construction or operates before other wind farms in the area then the predicted noise levels would not need to factor in cumulative impacts against the criteria. If other wind farms begin operation before Rye Park Wind Farm then cumulative impacts become a factor. In the case that all wind farms are operating the assessment shows that all relevant receivers in the NIA in Appendix B are predicted to be within the nominated WHO guideline noise limits. A revised NIA will be completed once the turbine layout and model are finalised. At this point the latest information about neighbouring wind farms will be addressed.

- Bango Wind Farm

Publicly available information for Bango Wind Farm shows that that the wind turbine area is at least 4 km's from any dwelling assessed in the NIA in Appendix B (Bango Wind Farm Newsletter #2 February 2012). At this distance the impact of the addition of one wind turbine at a sound power level of 106.5dBA would increase the noise level at a dwelling by a small amount in the order of 0.1dBA based on conservative modelling assumptions (ISO9613-2). In reality the potentially most impacted dwellings would be those that sit in between the two wind farms, however these dwelling would not receive the full predicted noise level from both wind farms at the same time as the wind cannot blow from two different directions (noting that the greatest noise impact on a dwelling is when the dwelling is downwind from a turbine – as assumed in ISO9613-2).

The small increases in noise levels are due to the noise impact being greatest from the closest noise sources, in this case Rye Park Wind Farm. The compliance margin or difference between predicted noise levels and compliance criteria is greater than 0.9dBA at all receivers except R32 and R38. To increase the predicted noise level at a receiver by 0.9dBA, 9 turbines located at 4km from the receptor would be required. This is unrealistic given the minimum spacing requirements of wind turbines of at least 250m and as such would not affect compliance at these receptors.

For the two receptors that have a compliance margin less than 0.9dBA, they both are at least 7km from the closest wind turbine area of Bango Wind Farm. In addition to this considerable distance over 25 turbines are closer to each receptor and dominate the noise level contribution. As such compliance remains unchanged at all receptors with cumulative impacts accounted for.

- Rugby Wind Farm

Publicly available information for Rugby Wind Farm shows that that the wind turbines are located directly north of Rye Park Wind Farm. Noise modelling of this layout (ref: WTG_Rev63) was carried out based on an indicative turbine, in this case a turbine with Sound Power Level of 106.5dBA and based on conservative modelling (ISO9613-2). The predictions show that the cumulative wind farm noise level increases by less than 0.9dBA at all assessed receptors except one, in most instances the predicted cumulative increase is negligible and less than 0.1dBA. As such the compliance criteria is met based on predicted cumulative noise levels.

We note that the receiver R1 is an uninvolved landowner with Rye Park Wind Farm, however, it is an involved landowner as part of Rugby Wind farm. Should Rugby Wind Farm proceed to be constructed first (or both wind farms are operating), receptor R1 will have a noise criteria of 45dBA according to the WHO guidelines. The cumulative noise modelling shows that compliance is predicted to be achieved. If Rye Park Wind Farm proceeds to be constructed first R1 will comply according to SA EPA guidelines as assessed in the NIA in Appendix B.

Visual

An assessment of cumulative visual impacts considers the potential impact of a proposal in the context of existing developments and future developments to ensure that any potential environmental impacts are not considered in isolation.

'Direct' cumulative visual impacts may occur where two or more winds farms have been constructed within the same locality and are simultaneously viewed from the same receptor location.

'Indirect' cumulative visual impacts may also arise as a result of multiple wind farms being observed from the same receptor location, but do not overlap or occur within a single field of view.

'Sequential' cumulative visual impacts may also arise as a result of multiple wind farms being observed at different locations during the course of a journey (e.g. from a vehicle travelling along a highway or from a network of local roads), which may form an impression of greater magnitude within the construct of short term memory.

Following consultation with a number of Local Government Authorities there are no known smaller wind farm developments that have been approved, or are currently being assessed by Boorowa Council, Upper Hunter Shire Council or Yass Valley Council.

Long distance views (around 30 km) can be obtained toward the operational Gunning and Cullerin wind farms from elevated areas of the landscape to the south east of the Rye Park project area. Although visible, these wind farm developments are unlikely to result in any significant additional level of 'direct' and 'indirect' cumulative impact for view locations within the Rye Park 10 km viewshed due to the distance effect on overall visibility between the wind farm developments.

The proposed Bango and Rugby wind farm developments are currently in the planning stage. The proposed location and number of turbines associated with each development was not publically known or made available during the preparation of this EA. The potential for cumulative impact will be dependent on a number of factors such as the separation distance between turbines and layout of turbines relative to the proposed Rye Park project.

Whilst some degree of intervisibility between all 3 projects is expected, the nature and extent of the undulating landform surrounding each of the project sites, would partially limit the overall potential for 'direct' and 'indirect' views for many of the residential dwellings located between them.

A sequential view would occur for motorists travelling along local roads although the journey between the wind farms would include a range of views extending toward and beyond turbines. The extent and overall visibility of turbines would be influenced by the direction of travel relative to the alignment of wind turbines as well as the relatively short travel time along the local road network alongside and between the wind farm turbines.

Although there are other wind farm developments proposed in the vicinity of the Rye Park wind farm it is not certain all projects will be constructed, if approved, due to competing access to the electricity network and economic market limitations.

Traffic

In the event that Rye Park wind farm and the proposed Bango and Rugby wind farms are constructed concurrently, rather than sequentially, there is potential for cumulative traffic impacts arising out of the construction phases of these three projects due to their proximity to each other. Although there is no available information about the proposed traffic plans for Bango and Rugby wind farms the potential cumulative impacts are considered minimal as the main access routes for these other projects appears likely to utilise Lachlan Valley Way while the main access route to Rye Park is the Rye Park Dalton Road.

The Yass Valley and Conroys Gap wind farms are approximately 20 kilometres further west along the Hume Highway and utilise completely different access routes and roads. It is not considered likely that these two projects would cause cumulative impacts with respect to the Rye Park wind farm, even if all three were constructed concurrently.

It is considered that the Hume Highway has sufficient capacity to cater for the concurrent construction of all five wind farms in the region without compromising the road network capacity.

Ecology

There are a number of developments including wind farms in the region and the proposal may contribute to cumulative impacts from vegetation clearing and operational or alienation effects. In terms of operational impact, there are three operating wind farms within approximately 50 km of the project area. These comprise a total of 54 wind turbines (Cullerin Range Wind Farm: 15, Gunning Wind Farm: 31, Crookwell Wind Farm: 8). Several other wind farms are proposed within approximately 60 km of the project area including Rugby Wind Farm, Bango Wind Farm, Conroys Gap Wind Farm, and Yass Valley Wind Farm). The cumulative operational impact of these wind farms is unknown. The difficultly in drawing conclusions about cumulative operational risk is highlighted in a report commissioned by the Commonwealth Department of Environment and Heritage (Biosis 2006), *Wind Farm*

Collision Risk for Birds: Cumulative Risks for Threatened and Migratory Species (species considered included Swift Parrot and Tasmanian Wedge-tailed Eagle).

Biological impacts of wind farms can be far-reaching, because of the mobility of migratory, nomadic and territorial fauna species such as bats and birds, with the biggest concern stemming from potential bird and bat collision with operating turbines (Parsons and Battley, 2013). The operational and proposed wind farm localities in the district may involve overlapping raptor territories and bird and bat migration routes. However, based on the available habitat which has primarily been cleared in the local area and elsewhere in the district (especially to the west), and the absence of major wetlands, with the closest being Lake Burrinjuck (approximately 47 km to the south-west), the project site is not likely to be located on a major migratory route for wetland birds, seasonally migrating birds or microchiropteran bats. Visits from migratory or nomadic species are expected to be infrequent and sporadic. Additionally, given the low rate of raptor blade strike recorded at other Australian wind farms, as well as the more recently documented avoidance of turbines by Wedge-tailed Eagles at three wind farm sites in northern Tasmania (Hull and Muir, 2013), mortalities are not expected to affect local or regional populations by outstripping the reproductive capacity of any species. The location of the proposed wind farm turbines on largely cleared ridge top sites already compromised from long-term grazing, coupled with avoidance of clearing good condition woodland, should restrict the potential to affect locally declining woodland or wetland species.

For these reasons, the proposal is not expected to significantly add to the collective impacts of wind farms in the region nor is it expected to significantly affect migratory species such that whole populations would be at risk. However, if the ongoing monitoring and assessment of the operational impacts of all wind farms operating in the region becomes publicly available, the data should be reviewed to ensure cumulative impacts remain within acceptable limits. An adaptive monitoring and management program would be implemented to ensure that any unforeseen impact on bird or bat species are detected and addressed in a timely manner.

Heritage

The principles of ecologically sustainable development and the matter of cumulative harm to heritage values have been considered for the Rye Park wind farm. The project area is in a vast rural region and hence existing and future heritage impacts are low, despite the construction of numerous wind farms in the region. The majority of cultural values, including archaeological, which attach to the landform and the broader landscape remain intact across the region.

16.7.3 Mitigation

The following measures have been incorporated into the design of the wind farm or would be adopted to minimise potential cumulative impacts prior to construction:

- Establish and maintain communication with nearby wind farm developers so that details of other projects can be considered when available.
- Investigate CCC collaboration with matters such as traffic and transport plans for nearby projects.

17 Draft Statement of Commitments

Under transitional Part 3A projects, Proponents are required to provide a Statement of Commitments on how they propose to implement measures for environmental mitigation, management and monitoring for the project.

Avoidance and mitigation measures have been developed for the design, construction, operation and decommissioning phases of the project within this EA.

The commitments in this section have been developed into a comprehensive set of environmental impact avoidance and mitigation measures which incorporate:

- specific recommendations contained in the specialist reports; and
- additional measures identified during the preparation of this Environmental Assessment (in consultation with the community and government agencies).

In general, these issues will be incorporated and addressed in the proposed CEMP and OEMP.

To avoid duplication in this section, mitigation measures are located under the most appropriate heading only and are not repeated in subsequent sections.

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
1	General	Revisions to approved development	No material increase in impact	Ensure that any minor changes, including micro-siting up to 100 m in any direction, to the proposed development do not create any material increase in overall environmental impact. In the event of any significant or material changes to the wind turbine layout, an updated noise assessment and visual impact assessment will be submitted as required prior to construction.	Design	DP&I
2	General	Loss or modification of habitat	Mitigate impact	Implement a Construction Environmental Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP) in accordance with the Best Practice Guidelines for Wind Energy Projects (Auswind, 2006).	Construction	CEMP OEMP
3	Visual	Deterioration of visual amenity	Mitigate impact	The Proponent will respond to written requests from owners of residential dwellings or businesses located within 2 km of a visible wind turbine(s) to undertake reasonable landscape treatments to visually minimise views toward the wind turbine(s). A site visit would determine the extent and type of mitigation required. If vegetative screening is required, species selection would be determined in consultation with owners using specialist advice. An offer for reasonable landscape treatment would remain in place for a period of 6 months from commencement of the wind farm operation, to allow owners time to either adjust or to decide that landscape filtering or screening is warranted. Agreed landscape treatments would be completed within 1 year of an agreement for landscape treatments being reached.	Post Construction	CEMP OEMP
4	Visual	Deterioration of visual amenity	Mitigate impact	Prior to the commencement of construction the Proponent will consult with those residents, business owners or public authorities whose dwelling, business or public area, may be subject to moderate or high visual impact as defined in the approved Rye Park Wind Farm Landscape and Visual Impact Assessment.	Pre-construction	CEMP
5	Visual	Deterioration of visual amenity	Avoid impacts	Avoid use of advertising, signs or logos mounted on turbine structures, except those required for safety purposes.	Design	CEMP
6	Visual	Deterioration of visual amenity	Mitigate impact	Minimise activities that may require night time lighting, and if necessary or as required by an authority use low intensity lighting designed to be mounted with the light projecting inwards to the site to minimise glare at night.	Construction & Operation	CEMP OEMP
7	Visual	Deterioration of visual amenity	Mitigate impact	As far as feasible and reasonable, the Proponent will design and construct substations and associated facilities to minimise visual intrusion to the closest sensitive receivers.	Design	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
8	Noise	Construction noise	Minimise Impact	In general, construction activities associated with the project that would generate audible noise in excess of the requirements of the Interim Construction Noise Guidelines at any residence would be undertaken during the daylights hours of: Monday – Friday: 7am – 6pm Saturday: 8am – 1pm Sunday and public holidays: Not currently proposed Construction activities will comply with the Interim Construction Noise Guidelines (DECCW, 2009). These working hours have been proposed to allow reasonable efficiencies of effort to achieve maximum productivity and to minimise the overall construction duration but should not be restricted to daylight hours. Variations to these hours may be required subject to weather, safety and seasonal impacts. Any construction activities outside of the standard construction hours will only be undertaken in the following circumstances; a) Construction activities that generate noise that is: a. no more than 5dB(A) above rating background level at any residence in accordance with the ICNG (Table 2 of the ICNG); and b. no more than the noise management levels specified in Table 3 of the ICNG at other sensitive receivers; or b) for the delivery of material required outside those hours by the NSW police Force or other authorities for safety reasons (section 10.11.2); or c) where it is required in an emergency to avoid the loss of life, property and/or to prevent environmental harm; d) works as approved through the out-of-hours work protocol outlined in the Construction Noise and Vibration Management Plan as part of the Construction Environmental Management Plan.	Construction	CEMP
9	Noise	Construction	Minimise	Apply all feasible and reasonable work practices regarding construction machinery	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
		noise	Impact	including the use of temporary acoustic barriers, the use of silencers, improved vehicle noise control and the use of 'quiet work practices' (such as reducing or relocating idling machinery).		
10	Noise	Construction noise	Mitigate Impact	Implement a community consultation process to ensure adequate community awareness and notice of expected construction noise.	Construction	CEMP
11	Noise	Construction noise	Minimise Impact	Locate fixed noise sources such as crushing plant at the maximum practical distance to the nearest dwellings and where possible use existing landforms to block line of sight between equipment and the dwelling.	Construction	CEMP
12	Noise	Operational noise	Compliance	Ensure final turbine selection and layout complies with the SA EPA Noise Guidelines of 35 dB(A) or background plus 5 dB(A) (whichever is higher) for all non-involved residential receivers, other than those which have entered into a noise agreement with the Proponent in accordance with the SA EPA Noise Guidelines.	Detailed design	OEMP
13	Noise	Operational noise	Compliance	Ensure final turbine selection and layout complies with the World Health Organisation Guidelines for Community Noise requiring 45 dB(A) or background plus 5 dB(A) (whichever is higher) for all involved residential receivers and all non-involved residential receivers who have entered into a noise agreement with the Proponent in accordance with the SA EPA Noise Guidelines.	Detailed design	OEMP
14	Noise	Operational noise	Compliance	Prior to construction, prepare and submit to the DP&I a noise report providing final noise predictions based on any updated background data measured, the final turbine model and turbine layout selected, to demonstrate compliance with the relevant guidelines for all residences.	Detailed design	OEMP
15	Noise	Operational noise	Mitigate impact	If operational monitoring identifies an exceedance through a complaint hotline or other means that is investigated, consideration would be given to providing mechanical ventilation or other mitigation (to remove the requirement for open windows), building acoustic treatments (improving glazing) or using turbine control features (including the consideration of turning turbines off) to manage excessive noise under particular conditions.	Operation	OEMP
16	Noise	Operational noise	Compliance	Develop and implement an operational noise compliance testing program. The compliance program will commence 3 months before construction commencement and continue on a permanent basis for 2 years post commissioning. Permanent noise loggers will be installed at selected receivers for the duration of the compliance program, with noise data regularly downloaded and any potential exceedances noted for detailed analysis. The selected house locations will comprise	Operation	OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				of all houses within 2km of a turbine and selected representative houses within 2-5km.		
17	Ecology	Additional targeted surveys	Swift Parrot	For this species a specific risk window exists during migration (winter). Prior to approval an additional survey will be conducted between March and July to supplement the existing survey effort and further investigate the potential for impact on this species. The results of the further survey will either confirm the assumptions made by this assessment or be used to define additional measures to manage impact (including turbine removal, adjustments to timing of construction or other specific mitigation measures).	Design	CEMP
18	Ecology	Additional targeted surveys	Hollow-bearing trees	A hollow-bearing tree inventory would be compiled to map and document the characteristics of all hollow-bearing trees suitable for large forest owls, Squirrel Glider, Gang Gang Cockatoo, Glossy-black Cockatoo within 100m of a turbine, where they occur in mapped high habitat conservation value areas. Details including number, size of hollows, and habitat value would be recorded. Consideration would be given to micro-sting turbines more than 100m from these trees. Where turbines remain within 100m of hollow bearing trees, targeted surveys for the above species would be undertaken. Management prescriptions to manage impacts (including turbine removal or other specific mitigation measures) would be developed and included in the project description.	Design	CEMP
19	Ecology	Additional targeted surveys	Woodland birds	Additional bird surveys would be undertaken in moderate and high habitat conservation value in conjunction with hollow-bearing tree surveys. Consideration would be given to micro-siting turbines, based on these results, if required.	Design	CEMP
20	Ecology	Additional targeted surveys	Pink-tailed Worm-lizard and Striped Legless Lizard	Where infrastructure is proposed in good condition Box-Gum Woodland (CEEC), a tile survey for these species would be undertaken to verify whether the species occur. Turbines and infrastructure would be micro-sited to avoid impacts to areas of confirmed habitat for these species.	Design	CEMP
21	Ecology	Additional targeted surveys	Koala	A pre-clearance survey (scat surveys) for the Koala in good condition Box-Gum Woodland and good condition Inland Scribbly Gum Forest would be undertaken. If Koalas, or their scats are detected turbines and infrastructure would be micro-sited to avoid primary habitat. Prescriptions would be developed to minimise impacts during construction, if required.	Design	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
22	Ecology	Measures to minimise impact	Fauna habitat and EEC	The impacts of track and power-line construction would be minimised in areas of high conservation value fauna habitat and vegetation (EEC) by minimising track width to the minimum required for safe access and installing the 33kV powerline as underground rather than overhead line, co-aligned within the road verge.	Design	CEMP
23	Ecology	Measures to minimise impact	Birds and bats	Turbine and infrastructure design would minimise potential for operational impacts on bird and bats. Any lights required to be fitted to the towers would be red flashing lights to reduce attractiveness to insects (prey for bats) and possibly night-flying birds. Guy lines would not be fitted to turbine towers. Guy lines used on wind monitoring masts would be made bird-safe using flags or marker balls.	Design	CEMP
24	Ecology	Additional targeted surveys	EEC	Microsite with input from an ecologist; the proposed track in the area of good condition EEC and CEEC between turbines 114 and 120 and the ETL within good condition EEC and CEEC south of RYP_110.	Construction	CEMP
25	Ecology	Additional targeted surveys	Yass Daisy and Hoary Sunray	Potential habitat for these species occurs in the good condition Box-Gum Woodland EEC and CEEC south of RYP_110. No clearing works to be undertaken in these patches unless targeted flora surveys have been undertaken (October to November). If found to be present at the site, infrastructure would be micro-sited to avoid impacting populations of these species.	Construction	CEMP
26	Ecology	Additional targeted surveys	Golden Sun Moth	A final inspection would be carried out after location of tracks and ETLs are finalised to determine whether Golden Sun Moth habitat will be impacted. If potential habitat is confirmed, targeted surveys will be undertaken for the Golden Sun Moth to identify: a) whether the species occurs on site; and b) high-use activity areas. If habitat is confirmed through the above survey, a Golden Sun Moth survey will be undertaken in the preceding emergence and breeding period of the species, which is mid-October to mid-January. Surveys will be undertaken in accordance with *Significant Impact Guidelines for the critically endangered Golden Sun Moth (Synemon plana)* (DEWHA 2009a). It is noted that it may be difficult to rule out presence of the species on the basis of surveys, due to the cryptic nature of the moth. Exclusion zones will be delineated in areas the species is found or in areas that indicate a high likelihood that it can occur (i.e. if surveys do not result in detection, but habitat is considered appropriate and highly likely to support the species). Infrastructure and vehicle access would be excluded in these zones such that a significant impact to this species would be avoided. Infrastructure near the exclusion zones would be micro-sited to avoid a significant impact to this species. If	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				habitat and species is confirmed through the above surveys, undertake construction works well outside of the flying and breeding period (i.e. works would be undertaken between 1 March and 30 September).		
27	Ecology	Environmental management framework	Flora and fauna management	The area to be disturbed by the development will be minimised by, clearly demarcating works areas and restricting impacts to these areas. This includes vehicle and equipment parking and access routes. Trees and features to be retained will be communicated to staff via inductions and other methods. Co-locating underground and overhead 330kV powerlines with the track network to minimise additional impact area, where practical and possible in areas of high conservation value (EEC and CEEC areas only) and the construction compound would be established in a disturbed area. Disturbed areas would be used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil wherever practicable.	Construction	CEMP
28	Ecology	Environmental management framework	Weed management	The impact footprint would be inspected for noxious weeds prior to the commencement of works. Noxious weeds in the vicinity of the works site would be treated prior to commencement of works, subject to seasonal factors. Noxious weeds within the works areas would be controlled according to control plans and measures recommended by the Boorowa Shire Council prior to works being undertaken. All herbicide treatment in environmentally sensitive areas (e.g. Box-Gum Woodland EEC) would be undertaken with care to minimise impact on native species. No herbicide treatment would be undertaken in CEEC during the flying period of Golden Sun Moth (i.e. undertake chemical weed control between 1 March and 30 September). Machinery and vehicles used in construction works would be thoroughly cleaned of soil and vegetation matter, as necessary and subject to weather conditions, before and after site access to reduce the introduction and spread of weeds and pathogens. Weed monitoring would be carried out at all sites after the completion of construction works and ongoing weed control would occur where noxious or invasive species are recorded. In particular, monitoring would be undertaken during the late spring/early summer season following works, and remedial action taken as required. Good quality Box-Gum Woodland (CEEC and potential Golden Sun Moth habitat):	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				prior to construction, the area of Box-Gum Woodland within the impact footprint (in the ETL) would be clearly marked out, including with signage "environmentally sensitive area". A clean-down area would be set up at both (north and south) entry/exit points into the CEEC area, and a protocol developed for all vehicles and machinery to be cleaned down as necessary prior to entering the CEEC. This will reduce the risk of weed spread into high conservation value areas within the site.		
29	Ecology	Environmental management framework	Pollution prevention	Where cement is included in the cable trench backfill, at least 20 cm of cement free topsoil will be replaced as the top layer in the back fill. To protect aquatic habitats, an erosion and sediment control plan would be used to ensure appropriate controls are in place prior to commencement of works and are maintained throughout the works period.	Construction	CEMP
30	Ecology	Environmental management framework	Riparian or inundated area management	Creek crossing to be designed in accordance with: NSW Fisheries Policy and Guidelines for Fish Friendly Waterway Crossings (2003). Creek works not to be undertaken when heavy rain is forecast and would be avoided when there is flow. Implement sedimentation and erosion controls in accordance with best practice guidelines. Minimising the construction footprint in riparian or periodically inundated areas and implementing sediment and erosion controls will safeguard Sloane's Froglet habitat.	Construction	CEMP
31	Ecology	Environmental management framework	Site stabilisation, rehabilitation and revegetation	In areas dominated by exotic groundcover species, exposed soils would be lightly mulched with chipped vegetation or sterile hay, and sown with an appropriate cover crop in consultation with the land owners, to stabilise the soils. In areas dominated by native grasses, exposed soils would be lightly mulched with chipped native vegetation or sterile hay, and sown with local provenance local grasses. Fertiliser would not be used to promote revegetation in native grass dominated areas of the site, to reduce weed pressures.	Construction	CEMP
32	Ecology	Environmental management framework	Box-Gum Woodland	In areas of EEC and CEEC, the works area would be clearly demarcated and disturbance strictly confined. Contractors and staff would be made aware of the significance and sensitivity of adjacent areas.	Construction	CEMP
33	Ecology	Environmental management framework	Superb Parrot	A 100m buffer (exclusion zone) would be applied to all known nest sites.	Construction	CEMP
34	Ecology	Environmental	Hollow-	Where hollow-bearing trees are to be cleared, a standard pre-clearance survey,	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
		management framework	bearing tree removal	such as that described in *Biodiversity Guidelines* (**ngh**environmental / RTA 2011), would be undertaken. Hollow-bearing trees would be felled with the assistance of an ecologist or wildlife handler, to minimise risk of injury to resident fauna. Hollows considered to have potential for Superb Parrot would not be felled during the breeding season between 1 August and 31 December.		
35	Ecology	Measures to minimise impacts	Birds and bats	An adaptive Bird and Bat Management Plan would be prepared to manage blade-strike risk to birds and bats. The primary aim of the program would be to ensure that unacceptable impact to threatened species is avoided. The plan would be developed with input from OEH and other experts as required, and would be implemented by an appropriate (ecological) expert. Survey design and analysis of results would incorporate a role for a statistician to ensure the data can provide meaningful results. The plan would monitor, report on and manage collision impacts during the operational phase.	Operation	OEMP
36	Ecology	Measures to minimise impacts	Flora and fauna management	Vegetation would be allowed to regrow under the ETL to the maximum allowable height for power lines to maintain fauna habitat connectivity.	Operation	OEMP
37	Ecology	Measures to minimise impacts	Flora and fauna management	A flora and fauna management plan would be developed prior to decommissioning to manage decommissioning impacts on biodiversity values. Biodiversity investigations would be required prior to decommissioning, to update the knowledge of site attributes and evaluate specific impact types (given the life span of the proposal is in the order of 30 years) and to minimise biodiversity impacts related to the removal of infrastructure. New measures to avoid and mitigate impacts may be required depending on: 1) the results of the investigation; and 2) outcomes of the monitoring programs implemented during the operational phase of the proposal. Any implementation of a rehabilitation plan would consider the above plans and the environment at the time of decommissioning.	Decommissioning	OEMP
38	Ecology	Measures to offset impacts	Hollow-bearing trees	A hollow-bearing tree inventory would be compiled to map and document the characteristics of all hollow-bearing trees required to be removed. Hollow-bearing trees would be offset at a ratio of one for one, or better, to maintain or improve the availability of the resource in the locality. Ecological advice would be sought if artificial hollows are to be installed.	Offsetting	CEMP / OEMP
39	Ecology	Measures to offset impacts	Native vegetation	An Offset Plan would be developed with input from OEH and the CMA and finalised prior to any construction impacts. The objective of offsetting is to ensure that an overall 'maintain or improve' outcome is met for the project; where impacts cannot	Offsetting	CEMP / OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				be avoided, or sufficiently minimised, the residual impact will be offset in perpetuity. The biodiversity offset principles developed by the former DECCW (now OEH) would guide the selection and management of the offset site. The plan would demonstrate the following can be achieved: • For common vegetation types a ratio of approximately 1:2 (cleared: offset) is proposed. Where vegetation is listed as an endangered community, such as the Box-Gum Woodland EEC, a ratio of 1:5 to 1:10 (cleared:offset) is proposed, depending on the quality of habitat. • Hollows removed would be offset at a ratio of 1:1 (offset site vegetation must contain the same number of hollows, or more). • The offset site would be protected in perpetuity and appropriate management actions attached to the land title. For example, fencing and signage maintained, minimum biomass to be retained (through controlled grazing if appropriate), regular weed control.		
40	Heritage	Disturb identified area	Avoid Impact	Identify and protect the three milky quartz outcrops (Potential Aboriginal Heritage) that need to be avoided during construction. The strategy to achieve this would be set out in a Cultural Heritage Management Plan.	Detailed design & construction	CEMP
41	Heritage	Disturb identified area	Avoid Impact	Identify and protect the three European heritage sites that need to avoided during construction	Detailed design & construction	CEMP
42	Heritage	Inadvertent disturbance of Aboriginal heritage sites or objects	Impact mitigation strategies implemented prior to impacts	Additional archaeological assessment to be conducted in any areas which are proposed for impacts in the event of any significant or material changes to the wind turbine layout and for any areas that have not been surveyed during the current assessment.	Detailed design & construction	CEMP
43	Heritage	Inadvertent disturbance of Aboriginal heritage sites or objects	Impact mitigation strategies implemented prior to impacts	An updated archaeological assessment to be conducted for any plans that are required to be prepared as part of the CEMP – such as sediment and erosional control plan and a traffic management plan.	Detailed design & construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
44	Heritage	Management of impact mitigation strategies	Impact mitigation strategies implemented prior to impacts	In consultation with the project archaeologist, develop a Cultural Heritage Management Plan. The development of an appropriate Cultural Heritage Management Plan should be undertaken in consultation with the registered Aboriginal parties and the NSW Office of Environment and Heritage.	Detailed design & construction	CEMP
45	Heritage	Management of impact mitigation strategies	Impact mitigation strategies implemented prior to impacts	Any proposed micro-siting of infrastructure to consider minimisation of impacts to Aboriginal cultural heritage values.	Detailed design & construction	CEMP
46	Heritage	Management of impact	To update AHIMS database on status of sites	Completion of OEH Aboriginal Site Impact Recording Forms and submission to OEH.	Construction	CEMP
47	Aircraft Hazards	Potential hazard	Minimise Impact	Liaise with all relevant authorities (CASA, Airservices, and Department of Defence) and supply location and height details once the final locations of the wind turbines have been determined and before construction commences.	Detailed design	CEMP
48	Aircraft Hazards	Potential hazard	Minimise Impact	Consult with the landowners and appropriate licensed contractors to discuss alternate measures for aerial spreading in areas affected by the turbines	Operation	OEMP
49	Communication	Deterioration of signal strength	Avoid impact	Locate wind turbines to avoid existing microwave link paths that cross each precinct, or liaise with the owners of such links to relocate services to avoid potential impacts from turbines.	Detailed Design	CEMP
50	Communication	Deterioration of signal strength	Avoid impact	Ensure adequate television reception is maintained for neighbouring residences as follows: • Undertake a monitoring program of houses within 5km of the wind farm site to determine any loss in television signal strength if requested by the owners. • In the event that after construction television interference (TVI) is experienced by existing receivers within 5km of the site, investigate the source and nature of the interference.	Operation	OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• Where investigations determine that the interference is cause by the wind farm, establish appropriate mitigation measures at each of the affected receivers in consultation and agreement with the landowners. Specific mitigation measures may include: • Modification to, or replacement of receiving antenna • Provision of a land line between the effected receiver and an antenna located in an area of favourable reception • Improvement of the existing antenna system • Installation of a digital set top box or In the event that interference cannot be overcome by other means, negotiating an arrangement for the installation and maintenance of a satellite receiving antenna at the Proponents cost.		
51	EMF	Radiation exposure from EMFs	Avoid Impact	Powerlines would be located in accordance with the minimum distances set in Country Energy's Procedural Guideline – Easement Requirements.	Detailed Design	CEMP
52	Shadow flicker	Safety & nuisance	Compliance	Appropriate mitigation measures will be negotiated and implemented, where necessary, including potential limiting hours of operation on selected turbines or pre-programming the control system of individual wind turbines to automatically shut down while these conditions are present.	Operation	OEMP
53	Shadow flicker	Safety & nuisance	Compliance	Shadow flicker effects on motorists would be monitored following commissioning and any remedial measures, if required, to address concerns would be developed in consultation with the RMS.	Operation	OEMP
54	Traffic	Safety and asset protection	Minimise Impact	The Proponent would develop and implement a Traffic Management Plan (TMP) in consultation with RMS and Councils to facilitate appropriate management of potential traffic impacts. The TMP would include provisions for: • Scheduling of deliveries and managing timing of transport • Limiting the number of trips per day • Undertaking community consultation before and during all haulage activities • Designing and implementing temporary modifications to intersections, roadside furniture, stock grids and gates	Construction	CEMP OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• Managing the haulage process, including the erection of warning and/or advisory speed signage prior to isolated curves, crests, narrow bridges and change of road conditions • Designation of a speed limit would be placed on all of the roads that would be used primarily by construction traffic • Preparation of a Transport Code of Conduct to be made available to all contractors and staff • Identification of a procedure to monitor the traffic impacts during construction and work methods modified (where required) to reduce the impacts • Provide a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures • Reinstatement of pre-existing conditions after temporary modifications to the roads and pavement along the route.		
55	Traffic	Safety and Asset protection	Minimise Impact	Engage a licensed haulage contractor with experience in transporting similar loads, responsible for obtaining all required approvals and permits from the RMS and Councils and for complying with conditions specified in those approvals. This would include the use of escorts for oversize and over-mass vehicles in accordance with RMS requirements	Construction	CEMP
56	Traffic	Safety and Asset protection	Minimise Impact	Prepare road dilapidation reports covering pavement and drainage structures in consultation with RMS and Councils for the routes prior to the commencement of construction and after construction is complete. Repair any damage resulting from the construction traffic (except that resulting from normal wear and tear) as required during and after completion of construction at the Proponent's cost or, alternately, negotiate an alternative for road damage with the relevant roads authority.	Construction	CEMP
57	Traffic	Road maintenance	Minimise Impact	Establish maintenance procedures covering pavement and drainage structures in consultation with RMS and Councils for the routes prior to the commencement of construction and which will be implemented during construction. The maintenance procedures would include provisions for: • Security for surety of funds to carry out the necessary maintenance works if required.	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• Quarterly review to assess serviceability of the road routes and if unserviceable to make maintenance improvements to restore. • Complaint management from community to be reviewed weekly. • Quick response method established for safety concerns raised.		
58	Traffic	Potential disruption to other road users	Mitigate Impact	Provide a 24hr telephone contact during construction to enable any issue or concern to be rapidly identified and addressed.	Construction	CEMP
59	Bushfire	Bushfire risk	Minimise Impact	Prepare a Bushfire Management Plan as part of the Construction Environmental Management Plan. The Rural Fire Service and NSW Fire Brigade would be consulted in regard to its adequacy to manage bushfire risks during construction, operation and decommissioning. The plan would as a minimum include: • Flammable materials and ignition sources brought onto the site, such as hydrocarbons, would be handled and stored as per manufacturer's instructions. • During the construction phase, appropriate fire fighting equipment would be held onsite when the fire danger is very high to extreme, and a minimum of one person on site would be trained in its use. The equipment and level of training would be determined in consultation with the local RFS. • Substations would be bunded with a capacity exceeding the volume of the transformer oil to contain the oil in the event of a major leak or fire. The facilities would be regularly inspected and maintained to ensure leaks do not present a fire hazard, and to ensure the bunded area is clear (including removing any rainwater). • Workplace health and safety protocols would be developed to minimise the risk of fire for workers during construction and operation. • Fire extinguishers would be stored onsite in the control building and within the substation building. • Shut down of turbines would commence if components reach critical temperatures or if directed by the RFS in the case of a nearby wildfire being declared (an all-hours contact point would be available to the RFS during the bushfire period). Remote alarming and maintenance procedures would also be used to minimise risks.	Construction Operation Decommissioning	CEMP OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• Overhead transmission easements would be periodically inspected to monitor regrowth of encroaching vegetation.		
60	Hydrology	Deterioration of water quality (Surface Water)	Minimise Impact	Ensure infrastructure, including turbines, tracks, substations, control buildings, stockpiles, and site compounds and turnaround areas, is not sited within 40 metres of a major drainage line or water course, where practical.	Detailed design	CEMP
61	Hydrology	Deterioration of water quality (Surface Water)	Avoid Impact	Prepare a Sediment & Erosion Control Plan as part of the Construction Environmental Management Plan. Soil and water management practices would be developed as set out in Soils and Construction Vol. 1 (Landcom 2004)	Construction	CEMP
62	Hydrology	Deterioration of water quality (Surface Water)	Minimise Impact	Ensure all vehicles onsite follow established trails where these exist or are practical and minimise onsite movements.	Construction Operation	CEMP OEMP
63	Hydrology	Deterioration of water quality (Surface and Ground Water)	Minimise Impact	Design concrete batch plants to ensure concrete wash would not be subjected to uncontrolled release. Bunded areas of the batching plant to contain peak rainfall events and remediate after the completion of the construction phase. Waste sludge would be recovered from the settling pond and used in the production of road base manufactured onsite. The waste material would be taken from the batching plant to be blended in the road base elsewhere onsite.	Construction	CEMP
64	Hydrology	Deterioration of water quality (Surface and Ground Water)	Minimise Impact	As soon as practical, stabilise exposed or clear areas to minimise erosion and sedimentation that can potentially pollute and dam watercourses in the area.	Construction	CEMP
65	Hydrology	Deterioration of water quality (Surface and Ground Water)	Minimise Impact	A Spill Response Plan would be prepared as part of the CEMP and OEMP.	Construction Operation Decommissioning	CEMP OEMP
66	Soils and Landforms	Erosion of disturbed land	Mitigate Impact	At the conclusion of the construction period, where practical, the disturbed areas of the site would be rehabilitated to a level suitable for the ongoing agricultural use of the land. The topsoil removed for construction activities would be stockpiled and reused for the rehabilitation of the areas around the turbine foundations, lay down and hardstand areas and along the access tracks.	Construction	CEMP
67	Soils and landforms	Contamination	Minimise Impact	Consult with involved property owners in relation to areas of land potentially contaminated by past land use and manage impacts in these areas to avoid	Detailed design	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				affecting any areas of contamination.		
68	Soils and landforms	Soil quality	Minimise impact	The Proponent would prepare a protocol in the instance that suspected contamination is unexpectedly found. Should contamination or potential contamination be disturbed during excavation works, the area would be assessed by appropriately qualified consultants and OEH would be notified if warranted.	Construction	CEMP
69	Soils and landforms	Soil loss or stability of landform loss	Minimise Impact	Concrete wash would be deposited in an excavated area, below the level of the topsoil, or in an approved landfill site. Where possible, waste water and solids would be reused onsite.	Construction	CEMP
70	Soils and landforms	Soil loss or stability of landform loss	Minimise Impact	Access routes and tracks would be confined to already disturbed areas, where practical. All contractors would be advised to keep to established tracks.	Construction	CEMP
71	Mineral Exploration	Conflict with mineral exploration	Avoid Impact	Liaise with the current mineral license holder providing a final turbine and infrastructure layout, prior to the construction phase.	Pre-construction	CEMP
72	Economic	Effect on local community	Maximise positive impact	Liaise with local industry representatives to maximise the use of local contractors and manufacturing facilities in the construction and decommissioning phases of the project.	Construction	CEMP
73	Economic	Effect on local community	Maximise positive impact	Liaise with the local visitor information centres to ensure that construction and decommissioning timing and haulage routes are known well in advance of works and to the extent practical coordinated with local events.	Construction	CEMP
74	Economic	Effect on local community	Maximise positive impact	Make available employment opportunities and training for the ongoing operation of the wind farm to local residents where reasonable.	Operation	OEMP
75	Economic	Community Fund	Continue consultation to maximise benefit	The proponent will continue consultation on a possible format for a community enhancement program • At least 6 months prior to the commencement of operations (final turbine commissioned), call a meeting of the Community Consultation Committee and consult with Council(s) with respect to establishment of the community fund; • Prior to the commencement of operation of the project, establish that community fund as required and publically announce the administration	Operation	OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				processes and current funding commitments of the fund; and, • Regularly make publicly available the details of the fund including its administration processes, funds made available, funding commitments and outcomes.		
76	Agriculture	Impact on current land use	Minimise Impact	Stock would be restricted from works areas where there is a risk stock injury or where disturbed areas are being stabilised.	Construction	CEMP
77	Agriculture	Impact on current land use	Minimise impact	Develop, implement and monitor the effects of a Site Restoration Plan. The plan would aim to stabilise disturbed areas as rapidly as possible. The Plan would consider: • Appropriate stabilisation techniques across the precincts • Suitable species for re-seeding (native species would be given preference due to their superior persistence and for conservation purposes) • Monitoring for weed and erosion issues.	Construction Decommissioning	CEMP
78	Agriculture	Impact on current land use	Minimise impact	Ensure that the switchyard and substation is appropriately fenced to eliminate stock ingress.	Operation	OEMP
79	Agriculture	Impacts on current activities	Minimise impact	If aerial agriculture activities are demonstrated to be materially disruptive on any property immediately adjacent to the site, due to the operation of turbines, the Proponent would consult with the affected landowner and implement appropriate mitigation measures where necessary taking into consideration the history of aerial agriculture activities. This could include funding the cost difference between the current aerial agricultural activities and a reasonable alternative method.	Operation	OEMP
80	Health and Safety	Safety of persons or stock	Minimise Impact	A detailed Health and Safety Plan would be prepared, as a sub plan of the Construction Environmental Management Plan, identifying hazards associated with construction works, the risks of the identified hazards occurring and appropriate safeguards would be prepared prior to the commencement of construction works. The Plan would include, but not be limited to: • Inductions for all contractors requiring site access. • Ensure all staff are appropriately qualified and trained for the roles they are undertaking.	Construction	CEMP
81	Health and	Safety of persons	Minimise	Appropriate safety measures will be implemented in accordance with good industry	Construction and	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
	Safety	or stock	Impact	practice and relevant legislation to ensure risk to general public mitigated, including clear marking of hazards and restricting access to public where required	Decommissioning	
82	Climate	Air quality	Minimise Impact	Dust levels at stockpile sites would be visually monitored. Dust suppression would be implemented if required. Stockpiles would be protected from prevailing weather conditions. An Air Quality Plan will be included in the final Construction Environmental Management Plan.	Construction	CEMP
83	Climate	Air Quality	Minimise Impact	Should a complaint relating to dust by a resident be received, monitoring at the boundary of the construction site would be undertaken using dust gauges. The Proponent would assess the dust gauges and undertake additional mitigation measures, where required.	Construction	CEMP
84	Resources	Waste generation	Minimise waste and maximise recycling of materials	The Proponent would prepare a Waste Management Plan to be included within the Construction Environmental Management Plan. It would include but not be limited to the following: • The scope for reuse and recycling would be evaluated • Provision for recycling would be made onsite • Wastes would be disposed of at appropriate facilities • Toilet facilities would be provided for onsite workers and sullage from contractor's pump out toilet facilities would be disposed at the local sewage treatment plants or other suitable facility agreed to by Council • Excavated material would be used in road base construction and as aggregate for footings where possible. Surplus material would be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated	Construction Operation	CEMP OEMP
85	Environmental Management	Quality Assurance	Compliance	Appoint a representative as a key contact for all environmental management issues.	Construction Operation	CEMP OEMP
86	Environmental Management	Quality Assurance	Compliance	Site induction for all workers and visitors to include maps of all sensitive areas and availability of CEMP and OEMP on site.	Construction Operation	CEMP OEMP
87	Environmental Management	Quality Assurance	Operational monitoring and Compliance	Will implement compliance and monitoring programme against permit conditions.	Operation	OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
88	Community Consultation	Project Information	Inform Community	Appoint a community liaison office to be available for consultation by the community and to provide information to the community about the status of the project.	Construction Operation	CEMP OEMP
89	Community Consultation	Project Information	Community liaison	Continue with the Community Consultation Committee as required during various stages of the project life cycle.	Construction Operation	CEMP OEMP

18 Conclusion

This Environmental Assessment has investigated and assessed the likely impacts that would result from the construction and operation of the proposed Rye Park Wind Farm, a project capable of generating around 378 MW of renewable energy.

The project has incorporated community feedback from consultation efforts and the environmental constraints identified during the assessment process and demonstrated how the feedback and constraints were applied to the design of the wind farm to arrive at the most appropriate site layout. It has also outlined the measures that will be taken to avoid and if necessary address the environmental risks and issues that have been identified for the construction, operation and decommissioning stages. These measures are supported by a statement of commitments.

The Proponent has prepared detailed studies by independent consultants on the key issues of:

- Landscape and Visual Impact Assessment;
- Operational and Construction Noise;
- Biodiversity (Flora and Fauna); and
- Indigenous Heritage (Archaeology).

Additional studies were conducted in relation to communications, traffic and transport, aviation, existing landscape and community issues such as economic, health and safety and community benefits.

A strategic justification for the project outlined the following benefits at the local, regional and global scales:

- In full operation, it would generate more than 1,192,000 MWh of electricity per year - sufficient for the average consumption of around 149,000 homes.
- It would improve the security of electricity supply through diversification of generation locations.
- It would reduce greenhouse gas emissions by approximately 1,153,000 tonnes of carbon dioxide equivalent (CO_2e) per annum.
- It would contribute to the State and Federal Governments' target of providing 20% of consumed energy from renewable sources by 2020.
- It would inject funds of up to $565 million into the economy.
- It would create local employment opportunities of up to 363 jobs during construction and up to 34 permanent jobs during the operational lifetime of the project.

The conclusion of the individual key issue assessments is that the proposed Rye Park Wind Farm can be constructed with minimal impact to the existing environment.

The success of the project in meeting the environmental requirements of "maintain or improve" relies on the effective implementation of both the Construction and Operational Environmental Management Plans. The Proponent is committed to ensuring the measures developed in these plans are best practice to ensure the best possible outcome for the Rye Park Wind Farm as well as the local and wider communities.

19 Glossary and Acronyms

Abbreviation	*Description*
AA	Airservices Australia
ABARE	Australia Bureau of Resource Economics
ABS	Australian Bureau of Statistics
ACMA	Australian Communications and Media Authority
AEMO	Australian Energy Market Operator
ALA	Aircraft Landing Area
An	Annum
APZ	Asset Protection Zone (for bushfire compliance)
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARTC	Australian Rail Track Corporation
AusWEA	Australian Wind Energy Association (previously Auswind)
BA	Biodiversity Assessment
CANRI	Community Access to Natural Resource Information
CAP	Catchment Action Plan
CASA	Civil Aviation Safety Authority
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
dB(A)	Decibels (A weighted)
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (now OEH)
DECC	NSW Department of Environment and Climate Change (now OEH)
DECCCW	NSW Department of Environment, Climate Change and Water (now OEH)
DEH	Commonwealth Department of Environment and Heritage, now the Department for Environment and Water Resources
DEUS	NSW Department of Energy Utilities and Sustainability (now OEH)
DEWR	Commonwealth Department for Environment and Water Resources, formerly the Department of Environment and Heritage
DGRs	NSW Department of Planning and Infrastructure's Director General's Requirements.
DP&I	NSW Department of Planning and Infrastructure
DPI	Department of Primary Industries
EA	This Environmental Assessment report

Abbreviation	*Description*
EEC	Endangered Ecological Community
EMF	Electromagnetic fields
EMP	Environmental Management Plan
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPA	Environmental Protection Agency
EPBC Act	Federal Environmental Protection and Biodiversity Conservation Act 1999
ESD	Ecologically Sustainable Development
FM Act	Fisheries Management Act
GBDLA	Green Bean Design Landscape Architects
GHG	Greenhouse Gas
GWh	gigawatt-hour
ha	hectare (unit of area 100m x 100m)
HBT	Hollow-bearing tree
HF	High Frequency
ICN Guideline	DECC Interim Construction Noise Guideline 2009
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram
kL	Kilolitres
km	kilometre
kV	kilovolt
LAeq	Equivalent Sound Power (A weighted)
LALC	Local Aboriginal Land Council
LCA	Landscape Character Area
LEP	Local Environmental Plan
LGA	Local Government Area
LSALT	Lowest Safe Altitudes
LVIA	Landscape and Visual Impact Assessment
m	meter
m/s	meters per second
mG	milligauss
ML	Megalitres
MRET	Mandatory Renewable Energy Target
MTOW	Maximum Take-off Weight
MW	megawatt
MWh	megawatt-hour
NEM	National Electricity Market
NES	National Environmental Significance

Abbreviation	*Description*
NPI	National Pollutant Inventory
NRET	NSW Renewable Energy Target
OEH	Office of Environment and Heritage
OEM	Original Equipment Manufacturer
OEMP	Operational Environmental Management Plan
OLS	Obstacle Limitation Surface
PEA	Preliminary Environmental Assessment
POEO Act	Protection of the Environment Operations Act 1997
Proponent	Epuron Pty Ltd
REP	Regional Environmental Plan
RET	Renewable Energy Target
RFS	Rural Fire Service
RMS	Roads and Maritime Service
SA EPA Guidelines	South Australian Environment Protection Authority Environmental Noise Guidelines: Wind Farms (2003)
SIS	Species Impact Statement
SEPP	State Environmental Planning Policy
SKM	Sinclair Knight Merz
SoC	Statement of Commitments
tCO2e	Tonne of carbon dioxide equivalent
TMP	Traffic Management Plan
TSC Act	Threatened Species Conservation Act 1995
TVI	Television Interference
V	volt
VHF	Very High Frequency
W	watt
WHO	World Health Organisation
WTG	Wind Turbine Generator

20 Preparation of Environmental Assessment

This Environmental Assessment was prepared by Epuron and the content is not false or misleading. Specific sections were drawn from specialist consultants' reports as detailed in Table 20-1 below.

Table 20-1 Preparation of the Environmental Assessment

Section	*Description*	*Author*
9	Visual Assessment	Andrew Homewood Green Bean Design Landscape Architects
10	Operational and Construction Noise	Gustaf Reutersward SLR Consulting Pty Ltd
11	Ecology	Nick Graham-Higgs NGH Environmental Pty Ltd
12	Aboriginal and European Heritage	Julie Dibden NSW Archaeology Pty Ltd

21 References

ABS (2008) "*National Regional Profile: Upper Hunter Shire.*" Australian Bureau of Statistics. Retrieved November, 2012, from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/LGA17620Population/People12002-2006?opendocument&tabname=Summary&prodno=LGA17620&issue=2002-2006&num=&view=

ABS (2010) "*National Regional Profile: Warrumbungle Shire.*" Australian Bureau of Statistics. Retrieved November, 2012, from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/LGA18020Population/People12004-2008?opendocument&tabname=Summary&prodno=LGA18020&issue=2004-2008

ABS (2011a) "*National Regional Profile: Boorowa (A) (Local Government Area).*" Australian Bureau of Statistics. Retrieved July, 2012, from http://www.abs.gov.au/AUSSTATS/abs@nrp.nsf/Latestproducts/LGA11050Main%20Features12006-2010?opendocument&tabname=Summary&prodno=LGA11050&issue=2006-2010&num=&view=

ABS (2011b) "*National Regional Profile: Upper Lachlan Shire (A) (Local Government Area).*" Australian Bureau of Statistics. Retrieved July, 2012, from http://www.abs.gov.au/ausstats/abs@nrp.nsf/Latestproducts/LGA17640Main%20Features12006-2010?opendocument&tabname=Summary&prodno=LGA17640&issue=2006-2010&num=&view=

ABS (2011c) "*National Regional Profile: Yass Valley (A) (Local Government Area).*" australian Bureau of Statistics. Retrieved July, 2012, from http://www.abs.gov.au/AUSSTATS/abs@nrp.nsf/Latestproducts/LGA18710Main%20Features12006-2010?opendocument&tabname=Summary&prodno=LGA18710&issue=2006-2010&num=&view=

ACTCOE (2000) "*'Bioregions' State of the Environment Report, Australian Capital Region.*" ACT Commissioner for the Environment. Retrieved August, 2012, from http://www.begavalley.nsw.gov.au/environment/soe/Region/subregions/bioregions/ibra.htm

AEMO (2010) *Electricity Statement of Opportunities for the National Electricity Market*. Australian Energy Market Operator.

AEMO (2011) "*2011 Electricity Statement of Opportunities.*" Retrieved September, 2012, from www.aemo.com.au/planning/0410-0079.pdf

ARPANSA (2011a) "*Fact Sheet 19 Electricity and Health.*" Australian Radiation Protection and Nuclear Safety Organisation. Retrieved August, 2012, from http://www.arpansa.gov.au/pubs/factsheets/019is_electricity.pdf

ARPANSA (2011b) "*Radiation Health Committee Publication Program.*" Australian radiation Protection and Nuclear Safety Organisation. Retrieved August, 2012, from http://www.arpansa.gov.au/publications/rhc/rhc_pubs.cfm

AusWEA (2001) "*Fact Sheet 11 - Wind Farm Safety Issues.*" Australian Wind Energy Association. Retrieved July, 2012, from http://www.w-wind.com.au/downloads/CFS11SafetyIssues.pdf

Baidya Roy, S., et al. (2004) "*Can large wind farms affect local meteorology.*" J. Geophys. Res **109**: D19101.

CMA (2012) "*Catchment Management Authorities – Lachlan, Murrumbidgee.*" Catchment Management Authority. Retrieved August, 2012, from http://www.cma.nsw.gov.au/

CSIRO (2012) *Exploring Community Acceptance of Rural Wind Farms in Australia: A Snapshot* CSIRO Science into Society Group.

DCC (2009) *Australia's Renewable Energy Target*. Department of Climate Change.

DEC (2005) *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*. Department of Environment and Conservation.

DECCW (2009) "*New South Wales State of the Environment 2009.*" Department of Environment, Climate Change and Water. Retrieved June, 2012, from http://www.environment.nsw.gov.au/soe/soe2009/chapter2/

DECCW (2010a) *Aboriginal Cultural Heritage Consultation Requirements for Proponents*. Department of Environment, Climate Change & Water.

DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. Department of Environment, Climate Change and Water.

DECCW (2010c) *Estimating Greenhouse Gas Emissions Abatement from Wind Farms in NSW*. NSW Department of Environment, Climate Change and Water.

DEUS (2006) "*NSW Renewable Energy Target: Explanatory Paper.*" Department of Energy, Utilities and Sustainability, . Retrieved June, 2012, from http://www.environment.nsw.gov.au/resources/climatechange/NRETPaperFINAL.pdf

DEWHA (2009) "*Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana).*" Department of Water, Heritage and the Arts. Retrieved October, 2012, from http://www.environment.gov.au/epbc/publications/golden-sun-moth.html

DPI (2010) "*Draft Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources - Yass Catchment Groundwater Source.*" Department of Primary Industries Office of Water. Retrieved August, 2012, from http://www.water.nsw.gov.au/Water-management/Water-sharing-plans/Plans-commenced/Water-source/NSW-Murray-Darling-Basin-Fractured-Rock/default.aspx

DPMC (2006) *Uranium Ming, Processing & Nuclear Energy - Opportunities for Australia*. Department of the Prime Minister and Cabinet.

DSEWPC (2009) "*Biodiversity Assessment – South East Highlands.*" Department of Sustainability, Environment, Water, Population and Communities. Retrieved October, 2012, from http://www.anra.gov.au/topics/vegetation/assessment/vic/ibra-south-eastern-highlands.html

DSEWPC (2011) *State of the Environment 2011*. Department of Sustainability, Environment, Water, Population and Communities.

F&R NSW (2007) "*Hazardous materials (HAZMAT).*" Fire & Rescue NSW. Retrieved June, 2012, from http://www.fire.nsw.gov.au/page.php?id=19

GGAS (2011) "*Fact Sheet - The New South Wales Pool Coefficient.*" Greenhouse Gas Reduction Scheme. Retrieved June, 2012, from http://www.greenhousegas.nsw.gov.au/

Harding, G., et al. (2008) "*Wind Turbines, Flicker, and Photosensitive Epilepsy: Characterizing the Flashing that may Precipitate Seizures and Optimizing Guidelines to Prevent Them.*" Epilepsia **49**(6): 1095-1098.

Hull, C. and S. Muir (2013) "*Behavior and Turbine Avoidance Rates of Eagles at Two Wind Farms in Tasmania, Australia.*" Wildlife Society **37**(1): 49-58.

ICNIRP (1998) "*Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (up to 300 Ghz).*" I. C. o. N.-i. R. Protection. Retrieved August, 2012, from http://www.icnirp.de/documents/emfgdl.pdf

IPCC (2008) *Climate Change 2007: Synthesis Report*. Intergovernmental Panel on Climate Change.

Iravani, R., et al. (2004) "*The Health Effects of Magnetic Fields Generated by Wind Turbines.*" Retrieved August, 2012, from http://www.windrush-energy.com/update%20Jul%2024/Appendix%20D%20-%20Magnetic%20Field%20Survey/Magnetic%20Field%20Report.pdf

ISSC (2005) "*ISSC 3 Guidelines for managing vegetation near power lines.*" Industry Safety Steering Community - Department of Energy, Utilities and Sustainability, . Retrieved August, 2012, from http://www.trade.nsw.gov.au/energy/electricity/networks/safety/electricity_network_safety_issc_3_guideline_for_managing_vegetation_nea_power_lines.pdf

Kordia (2009) *Long Gully Wind Farm Compatibility with Radio Services*. Kordia.

LCMA (2007) "*The Catchment.*" Lachlan Catchment Management Authority. Retrieved August, 2012, from http://web.archive.org/web/20070828193838/http://www.lachlan.cma.nsw.gov.au/catchment.html

Lloyd, A., et al. (2006) "*Bat activity on riparian zones and upper slopes in Australian timber production forests and the effectiveness of riparian buffers.*" Biological Conservation **129**: 207-220.

Madders, M. and D. Whitfield (2006) "*Upland Raptors and the Assessment of Wind Farm Impacts.*" Ibis **148**: 43-56.

Maslanyj, M. (1996) *Power-frequency Electromagnetic Fields Associated with Local Area Substation*.

MCMA (2012) "*Murrumbidgee Catchment: Rich and Diverse.*" Murrumbidgee Catchment Management Authority. Retrieved August, 2012, from http://www.murrumbidgee.cma.nsw.gov.au/about/catchment.aspx

Mitchell, P. (2002) *Descriptions for NSW (Mitchell) Landscapes - Version 2*. Department of Environment & Climate Change.

Morgan (2011) *Delineation and description of the Eastern Environmental Subregions (provinces) in New South Wales*. NPWS. Hurstville.

NASA (2001) *ASRS Launches Aviation Security Study*. Office of the NASA Aviation Reporting System. Moffet Field, CA, USA.

National Grid (2011) "*Electric and Magnetic Fields.*" National Grid. Retrieved August, 2012, from http://www.emfs.info/Sources+of+EMFs/Overhead+power+lines/specific/

NHMRC (1989) "*Interim Guidelines on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields.*" N. H. a. M. R. Council. Retrieved August, 2012, from http://www.arpansa.gov.au/pubs/rhs/rhs30.pdf

NHMRC (2010) *Wind Turbines and Health*. National Health and Medical Research Council,.

NSW RFS (2006) "*Planning for Bush Fire Protection.*" New South Wales Rural Fire Service. Retrieved July, 2012, from http://www.rfs.nsw.gov.au/file_system/attachments/State08/Attachment_20070301_0A17F845.pdf

NSW RFS (2010) "*Standards for Asset Protection Zones.*" New South Wales Rural Fire Service. Retrieved July, 2012, from http://www.rfs.nsw.gov.au/file_system/attachments/State/Attachment_20060130_7DE0A145.pdf

OCE (2004) "*State of the Environment Report 2004 - Yass Valley.*" The Office of the ACT Commissioner for the Environment. Retrieved August, 2012, from http://www.envcomm.act.gov.au/soe/soe2004/YassValley/groundwater.htm

OEH (2009) "*New South Wales State of the Environment 2009.*" Office of Environment and Heritage. Retrieved September, 2012, from http://www.environment.nsw.gov.au/soe/soe2009/

OEH (2011a) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*. Office of Environment and Heritage.

OEH (2011b) "*South Eastern Highlands Bioregion.*" Department of Environment & Heritage. Retrieved July, 2012, from http://www.environment.nsw.gov.au/bioregions/SouthEasternHighlandsBioregion.htm

Osten, T. and T. Pahlke (1998) *Shadow Impact on the Surrounding of Wind Turbines*. DEWI Magazine

Parsons, S. and P. Battley (2013) "*Impacts of wind energy developments on wildlife: a southern hemisphere perspective.*" New Zealand Journal of Zoology **40**(1): 1-4.

Rash, C. E. (2004) *Awareness of Causes and Symptoms of Flicker Vertigo Can Limit Ill Effects* Human Factors and Aviation Medicine

SEAV (2003) *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria*. Sustainable Energy Authority Victoria,.

SEDA (2002) *Wind Energy Handbook*. Sustainable Energy Development Authority.

SKM (2012) *Wind Farm Investment, Employment and Carbon Abatement in Australia*. Sinclair Knight Merz, Clean Energy Council.

Smales, I. (2006) *Impact of Avian Collisions with Wind Power Turbines: An Overview of the Modelling of Cumulative Risks posed by Multiple Wind Farms*. Biosis Research.

State Water (2009) "*Burrinjuck Dam - Dam Facts and Figures.*" State Water Corporation. Retrieved August, 2012, from http://www.statewater.com.au/_Documents/Dam%20brochures/Burrinjuck%20Dam%20Brochure.pdf

Tourism NSW (2012a) "*New South Wales State Tourism Statistics.*" Tourism NSW. Retrieved October, 2012, from http://archive.tourism.nsw.gov.au/State_Tourism_Statistics_p572.aspx

Tourism NSW (2012b) "*Travel to Capital Country.*" Tourism NSW. Retrieved October, 2012, from http://archive.tourism.nsw.gov.au/Sites/SiteID6/objLib93/Capital-Country-YE-Jun-12.pdf

TransGrid (2012) "*New South Wales Annual Planning Report 2012.*" Retrieved September, 2012, from http://www.transgrid.com.au/network/np/Documents/TRAN_219219_Annual_Planning_Report_2012_FA_web.pdf

ULSC (2007) "*Economic Development Plan and Strategy, Final Report 14 September 2007.*" Upper Lachlan Shire Council. Retrieved October, 2012, from http://upperlachlan.local-e.nsw.gov.au/images/documents/upperlachlan/Planning/Strategies/5426-EconomicDevelopmentPlanStrategyOct07.pdf

Warren, C. R., et al. (2005) "*'Green On Green': Public perceptions of wind power in Scotland and Ireland.*" Journal of environmental planning and management **48**(6): 853-875.

Yang, M. S. and T. L. Kwan (2001) "*Determination of probability distributions for Strahler stream lengths based on Poisson process and DEM.*" Hydrological sciences journal **46**(5): 813-824.

YVC (2012) "*Development of Elevated Land.*" Yass Valley Council. Retrieved October, 2012, from http://www.yass.nsw.gov.au/images/documents/yassvalley/Policies/da-pol-5%20development%20on%20elevated%20land%20.pdf

Attachment 1 – Involved Landowner Parcels

Lot/DP
1/211320
1/222985
1/575206
1/601586
1/705655
1/746015
1/1180139
2/222985
2/232571
2/601586
2/705655
2/1066057
2/1180139
3/1066057
4/1066057
12/754102
16/754102
17/754136
18/754136
22/754102
23/754102
29/754102
30/754102
31/754102
32/754122
34/754136
35/754102
39/754142
40/754142
41/754102
46/754099
47/754136
48/754099
48/754102
48/754136

Lot/DP
50/754102
54/754102
55/754102
55/754136
56/754102
56/754136
58/754099
58/754102
59/754099
59/754102
60/754102
61/754136
62/754136
63/754099
63/754136
64/754102
70/754102
71/754102
72/754136
75/754099
78/754102
79/754136
80/754099
80/754102
80/754136
81/754136
81/754142
82/754136
88/754136
89/754136
90/754102
91/754102
91/754136
92/754099
92/754102

Lot/DP
92/754136
93/754136
94/754136
95/754136
96/754136
98/754102
101/754099
102/754099
103/754099
103/754136
104/754099
104/754142
105/754099
107/754099
108/754099
108/754136
110/754136
114/754136
115/754099
115/754142
117/754099
117/754102
117/754136
120/754102
123/754136
126/754136
127/754136
128/754136
129/754099
129/754136
130/754099
131/754099
131/754136
132/754099
132/754102

Lot/DP
133/754102
133/754136
134/754102
135/754136
137/754136
140/754136
142/754136
143/754106
143/754136
144/754106
144/754136
147/754136
149/754136
150/754136
152/754136
153/754136
155/754136
156/754102
157/754102
157/754136
158/754136
160/754136
161/754136
162/754136
163/754136
165/754102
166/754102
167/754102
175/754102
176/754102
177/754099
177/754102
178/754099
178/754102
179/754102

Lot/DP
181/754102
182/754102
185/754102
201/754102
202/754102
203/754102
207/754142
208/754142
209/754122
210/118333
214/754145
215/754142
216/754142
222/754122
223/754122
224/754122
228/754122
229/754122
235/754145
239/754145
240/754145
242/754145
249/754145
250/754145
257/754106
260/754106
269/754142
281/754142
295/754106
335/754106
337/754106
338/754106
339/754106
340/754106
341/754106

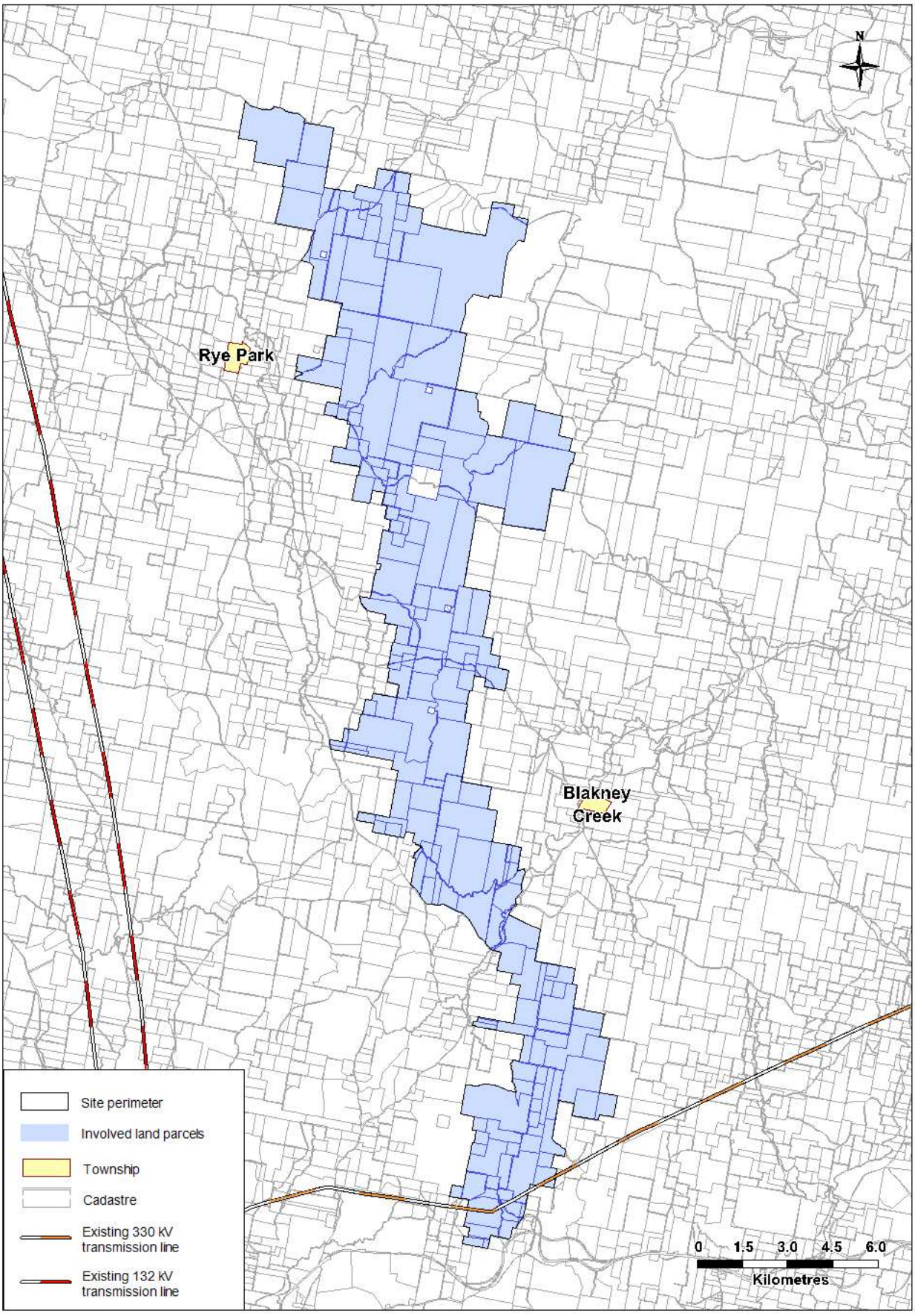
Lot/DP
347/754106
353/754106
357/754106

Lot/DP
360/754106
361/754106
364/754106

Lot/DP
368/754106
A/417584
A/439287

Lot/DP
B/417584
B/439287
D/440134

Lot/DP
E/418849
F/418849
N/439287


N
Rye Park
Blakney Creek
Site perimeter
Involved land parcels
Township
Cadastre
Existing 330 kV transmission line
Existing 132 kV transmission line
0 1.5 3.0 4.5 6.0
Kilometres

Attachment 2 – Residence Coordinates

Residence ID	Easting	Northing
R1	677,514	6,187,097
R2	678,095	6,185,733
R6	681,484	6,184,020
R7	681,917	6,183,967
R8	682,339	6,183,864
R9	682,517	6,183,837
R10	682,842	6,183,767
R11	679,650	6,183,618
R13	678,848	6,183,498
R14	677,807	6,183,115
R16	677,297	6,181,991
R17	676,127	6,181,740
R19	676,412	6,181,665
R20	676,130	6,181,544
R22	676,095	6,181,037
R25	677,075	6,178,323
R29	676,434	6,177,903
R30	682,495	6,177,218
R31	679,304	6,177,019
R32	680,416	6,176,683
R33	683,440	6,175,148
R34	681,817	6,174,338
R35	684,554	6,174,195
R26	676,523	6,178,178

Residence ID	Easting	Northing
R36	679,988	6,173,811
R38	679,623	6,173,620
R40	678,605	6,171,136
R41	681,802	6,168,516
R42	683,370	6,168,206
R44	679,986	6,166,322
R45	682,847	6,165,279
R46	681,835	6,164,679
R47	680,155	6,162,689
R48	679,834	6,162,662
R49	680,667	6,162,540
R50	680,701	6,161,784
R51	680,970	6,161,588
R52	684,135	6,161,246
R53	680,877	6,160,875
R54	683,514	6,155,819
R56	686,567	6,153,140
R59	684,670	6,149,654
R60	684,244	6,149,529
R61	684,489	6,149,335
R63	683,875	6,148,991
R62	683,916	6,149,096
R64	676,089	6,180,459
R65	676,668	6,179,644

Attachment 3 – Turbine Coordinates

All turbine coordinates are in MGA Zone 55 (GDA94)

Turbine ID	Easting	Northing	Height (m) (AHD)
RYP_1	676,564	6,186,549	711
RYP_2	676,472	6,186,222	707
RYP_3	676,314	6,185,896	700
RYP_4	676,330	6,185,493	680
RYP_5	677,768	6,185,211	715
RYP_6	676,382	6,185,154	663
RYP_7	677,495	6,184,969	725
RYP_9	677,401	6,184,643	712
RYP_11	677,311	6,184,316	735
RYP_12	677,296	6,183,710	722
RYP_15	679,837	6,182,935	680
RYP_16	677,936	6,182,341	713
RYP_17	681,368	6,182,677	725
RYP_18	678,374	6,182,450	705
RYP_19	679,787	6,182,460	675
RYP_20	681,054	6,182,311	743
RYP_21	678,367	6,182,056	695
RYP_22	679,549	6,181,988	690
RYP_23	680,763	6,182,056	730
RYP_24	678,328	6,181,719	702
RYP_25	679,390	6,181,590	705
RYP_26	678,533	6,181,400	707
RYP_27	679,405	6,181,226	710
RYP_28	678,462	6,181,063	738
RYP_29	678,286	6,180,743	742
RYP_30	678,947	6,180,723	740
RYP_31	680,348	6,180,539	750
RYP_32	678,568	6,180,422	740
RYP_33	680,289	6,180,212	745
RYP_34	678,881	6,180,044	725
RYP_35	679,583	6,180,016	739
RYP_36	680,191	6,179,884	732
RYP_37	679,001	6,179,677	710
RYP_38	679,651	6,179,673	740
RYP_39	680,117	6,179,419	713
RYP_40	679,031	6,179,317	710

Turbine ID	Easting	Northing	Height (m) (AHD)
RYP_41	679,998	6,179,121	707
RYP_42	680,995	6,179,014	700
RYP_43	679,099	6,178,990	695
RYP_44	678,960	6,178,675	685
RYP_45	678,480	6,178,580	668
RYP_46	678,271	6,178,267	672
RYP_47	678,208	6,177,947	690
RYP_48	681,519	6,177,806	759
RYP_49	681,955	6,177,677	720
RYP_50	681,373	6,177,455	771
RYP_51	681,386	6,177,112	740
RYP_52	681,577	6,176,633	725
RYP_53	681,202	6,176,809	740
RYP_56	681,467	6,176,284	717
RYP_57	681,003	6,176,478	720
RYP_58	682,453	6,176,166	720
RYP_61	680,897	6,176,158	745
RYP_62	680,706	6,175,844	745
RYP_63	682,350	6,175,648	715
RYP_64	682,965	6,175,563	725
RYP_65	684,812	6,175,373	660
RYP_66	682,356	6,175,315	705
RYP_67	680,268	6,175,239	695
RYP_68	684,506	6,175,044	668
RYP_69	682,310	6,174,976	716
RYP_70	680,093	6,174,954	662
RYP_71	682,030	6,173,110	712
RYP_72	681,954	6,172,668	706
RYP_73	681,140	6,172,249	710
RYP_74	681,365	6,171,943	720
RYP_75	681,396	6,171,612	730
RYP_76	680,459	6,171,477	713
RYP_77	681,472	6,171,274	735
RYP_78	680,811	6,171,208	705
RYP_79	680,690	6,170,761	700
RYP_80	681,995	6,170,333	756

Turbine ID	Easting	Northing	Height (m) (AHD)
RYP_81	682,067	6,170,012	740
RYP_82	681,994	6,169,687	744
RYP_83	681,814	6,169,343	730
RYP_84	681,410	6,167,593	760
RYP_85	681,737	6,167,307	745
RYP_86	681,708	6,166,805	750
RYP_87	681,530	6,166,407	732
RYP_88	681,527	6,166,012	731
RYP_89	681,413	6,165,704	745
RYP_90	681,236	6,165,399	735
RYP_92	681,120	6,164,499	730
RYP_93	680,884	6,164,219	735
RYP_94	680,719	6,163,835	705
RYP_95	681,554	6,163,638	745
RYP_96	682,225	6,163,319	740
RYP_97	682,415	6,162,895	710
RYP_98	682,312	6,162,559	725
RYP_99	682,367	6,162,222	715
RYP_100	682,341	6,161,882	704
RYP_101	682,364	6,161,545	695
RYP_102	686,212	6,156,702	739
RYP_103	686,019	6,156,364	745
RYP_104	686,076	6,156,057	740
RYP_106	685,011	6,155,209	722
RYP_107	685,039	6,154,927	730
RYP_109	685,446	6,154,514	730
RYP_110	684,866	6,154,437	720
RYP_119	683,638	6,152,682	745

Turbine ID	Easting	Northing	Height (m) (AHD)
RYP_120	684,989	6,152,786	745
RYP_121	684,859	6,152,485	740
RYP_122	683,572	6,152,342	730
RYP_123	682,735	6,152,317	749
RYP_124	685,097	6,152,167	725
RYP_125	684,291	6,151,984	730
RYP_126	682,641	6,151,797	746
RYP_127	684,340	6,151,640	720
RYP_128	683,144	6,151,393	701
RYP_129	684,435	6,151,261	723
RYP_130	683,128	6,151,059	695
RYP_131	683,010	6,150,732	707
RYP_132	678,712	6,182,642	690
RYP_133	678,009	6,181,394	700
RYP_134	677,936	6,181,067	710
RYP_135	679,234	6,180,352	740
RYP_136	680,737	6,181,711	730
RYP_137	680,639	6,181,386	725
RYP_138	680,610	6,181,042	730
RYP_139	680,929	6,177,667	770
RYP_140	680,772	6,177,337	723
RYP_141	680,422	6,175,567	710
RYP_142	684,451	6,152,329	730
RYP_143	681,450	6,167,984	755
RYP_144	678,532	6,177,708	672
RYP_145	686,041	6,154,260	715

Attachment 4 – Letter Confirming Part 3A Position

Attachment 5 – Director General's Requirements and Supplementary Director General's Requirements

Attachment 6 – Project Consultation Plan

Attachment 7 – Consultation Material

Appendix A – Landscape and Visual Assessment

Appendix B – Noise Assessment

Appendix C – Biodiversity Assessment

Appendix D – Aboriginal and European Heritage Assessment

Appendix E – Traffic and Transport Assessment

Appendix F – Telecommunications Impact Assessment

Appendix G – Decommissioning and Rehabilitation Plan

EPURON