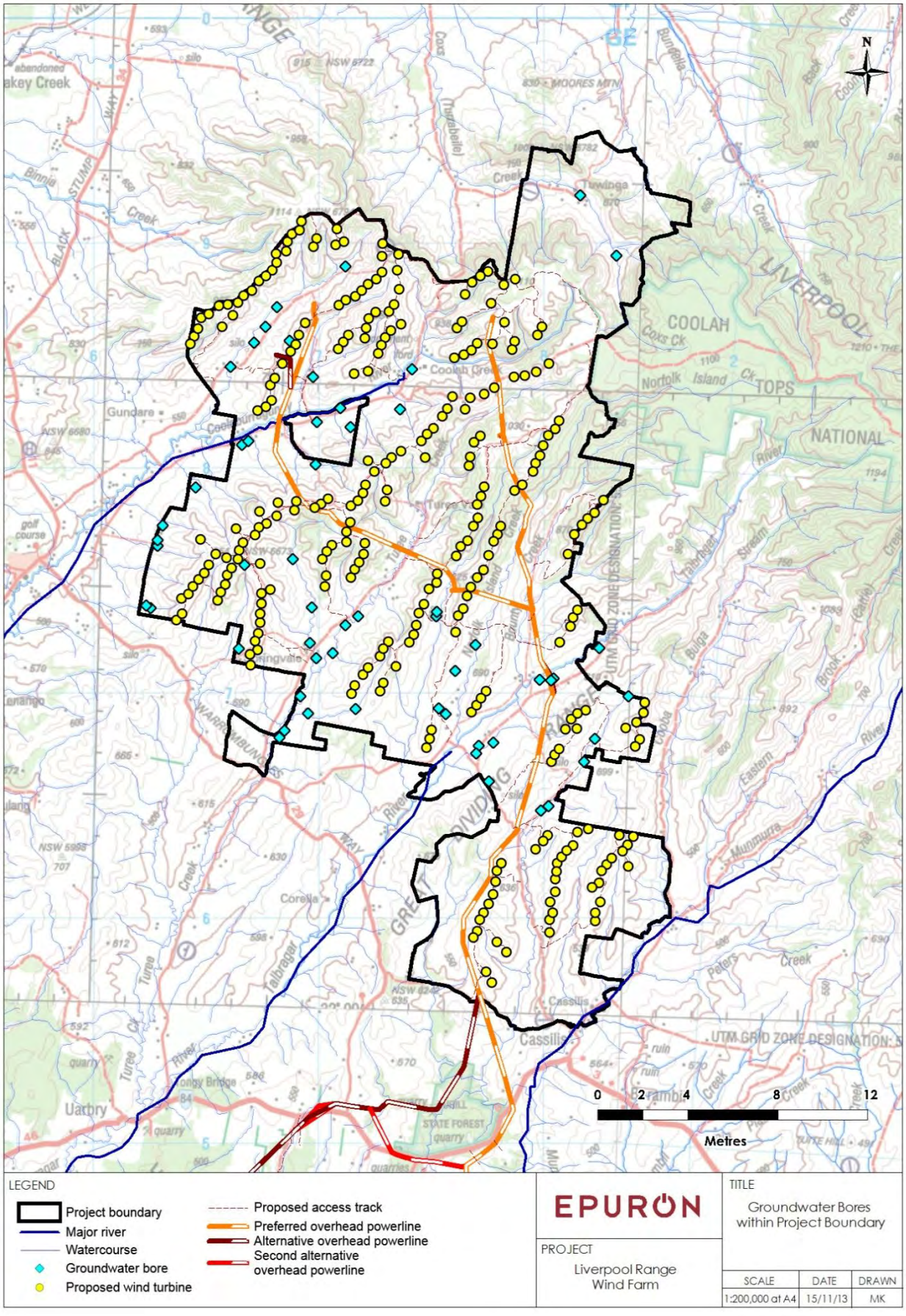

Figure 15-8 Groundwater bores within the project boundary

Table 15-1 – Groundwater bores within the project boundary of the Liverpool Range 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)
GW058367	1/01/1983	14.5	12.5	590	760	182.5
GW009966	1/01/1952	10.4		600	670	N/A
GW030976	1/12/1981	41		640	780	N/A
GW030977	1/12/1981	15.5	10.8	650	780	140.8
GW009704	1/01/1950	48.8		560	650	N/A
GW802394	19/04/2005	86	22	550	650	122
GW802681	10/06/2003	29.26	20	580	800	240
GW032160		9.1		570	780	N/A
GW056228	1/01/1940	8.6		560	770	N/A
GW056227	1/01/1940	39.6		610	730	N/A
GW032158	1/01/1947	6.8		560	740	N/A
GW054508	1/02/1981	5.8	4.9	570	730	164.9
GW802298	28/11/2003	48	10	600	770	180
GW032157		7.3		650	870	N/A
GW055779	1/06/1982	19.2	10.5	640	900	270.5
GW032162	1/08/1966	5.8		840	940	N/A
GW802978	7/04/2005	104	16	590	850	276
GW02679	1/01/1968	91.4	85.3	670	910	325.3
GW031175	1/01/1967	14		560	730	N/A
GW031287	1/11/1968	30.5	18.3	670	770	118.3
GW031286	570	7.6	5.2	570	730	165.2
GW802897	22/07/2004	48	15	570	730	175
GW031170	1/01/1967	22.3		540	640	N/A
GW031171	1/01/1967	15.2		540	630	N/A
GW031158		13.7		540	640	N/A
GW031168	1/01/1967	75.9		570	740	N/A
GW016876	1/11/1957	4.4	2.7	600	840	242.7
GW031165	1/01/1967	38.1		550	640	N/A
GW05012	1/12/1982	31	29	550	630	109
GW031164	1/01/1967	115		600	740	N/A
GW031166	1/01/1967	45.7		620	760	N/A
GW062941	1/08/1986	30.5	19.8	640	910	289.8
GW056017	1/12/1982	33.5	27.4		780	807.4

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)
GW057132	1/04/1983	137	115	560	720	275
GW043621	1/04/1974	9.4	7	560	720	167
GW800717	18/03/1995	17	9	640	860	229
GW033605	1/08/1970	21.3	4.6	600	780	184.6
GW066707	29/09/1989	27	11	620	780	171
GW026685	1/04/1966	15.2		600	920	N/A
GW026684	1/04/1966	122.8		740	380	N/A
GW055851	1/02/1983	151	128	580	900	448
GW026686	1/04/1966	14.6	5.5	620	800	185.5
GW055852	1/11/1982	41.1	36.5	640	860	256.5
GW800209	13/11/1994	7		720	1060	N/A
GW902014		12		600	1080	N/A
GW969133	25/06/2009	42	29	660	1080	449
GW032161		7		630	730	N/A
GW054986		12.2		610	810	N/A
GW059678	1/04/1982	42.7	36	610	810	236
GW038923		158.4		610	850	N/A
GW022191	1/01/1964	73.2		610	850	N/A
GW803490	24/09/2007	156	31.5	600	850	281.5
GW016274	1/03/1960	4.9	3.7	540	730	193.7
GW016275	1/10/1957	4.3	3	550	730	183
GW020071	1/12/1962	5.8		530	730	N/A
GW019925	1/01/1962	4.9		530	730	N/A

15.3 Construction and Operational Water Requirements

During the construction phase an estimated 59 ML of water will be required for general construction purposes and dust control. Locating concrete batching plants on site will require an additional 6-7 ML of water for foundations etc. For reference an average sized Olympic swimming pool contains around 2.5 ML of water.

Water for the project will be sourced primarily from Burrendong Dam and stored in onsite in tanks. The proponent has discussed the proposed arrangements with NSW Office of Water and has written to State Water seeking to progress the necessary arrangements to formalise the use of water during construction. As the water requirements for the project represents less than 0.006% of the capacity of the Burrendong Dam, the project is not expected to have a significant impact on ongoing dam operations.

Sourcing water from Lake Windamere is an alternative to the proposed use of Burrendong Dam water and will be progressed with State Water if required. Once the wind farm is completed and operational it will require only a very small volume of water (less than 1ML). 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. No treatment of this water is necessary.

Both Burrendong and Windamere Dams are expected to have sufficient capacity to supply the project's water supply requirements under all project operational modes (including construction and operation) and all meteorological conditions (including wet and dry weather scenarios).

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. These include:

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

Major impacts will be avoided or mitigated wherever possible. 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, and must be dealt with appropriately.

Areas of steep gradient present a higher hazard for erosion, and where possible existing access tracks will be utilised to minimise impact. Soils are more susceptible to erosion when disturbed or cleared of vegetation which can also lead to dust generation. Appropriate dust suppression and erosion avoidance techniques will be addressed in the CMP.

A water balance showing the total water use for the Liverpool Range Wind Farm is shown in Table 15-2 below.

Table 15-2 – Liverpool Range Wind Farm Water Balance

Water Source	*Water Sourced/Disposal*	***Use of Water***	***Water Quantity (ML)***
Burrendong Dam	Sourced	Construction	66
Onsite Rainwater Tanks	Sourced	Operation	1
Onsite Groundwater	Sourced	N/A	0
Concrete Liquid Waste Evaporated	Disposal	Construction	-7
Water Dust Suppression & General Construction	Disposal	Construction	-59
Onsite Rainwater Tanks	Disposal	Operation	-1
Total Water Use			67-67 = 0

15.5 Mitigation

The following mitigating measures for minimising disturbance and impacts of the site's 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 following 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 potentially pollute and block watercourses in the area.
- Design the concrete batch plants to ensure concrete wash would not be subjected to uncontrolled release. Bund areas of the batching plant to contain expected peak rainfall events and remediate after the completion of the construction phase. Waste sludge from the batching plant would be recovered from the settling pond and used in the production of road base manufactured 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. Any major potential impacts on local hydrology will be avoided or mitigated, ensuring that all impacts on draining and hydrology are acceptable.

The altitudes of the ridges across the site are some of the highest elevations in NSW and form a 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, with negligible dewatering volumes and no impact on drawdown zones or water quality.

[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

16.1.1 Existing Environment

Geology

The Brigalow Belt South Bioregion forms the southern extremity of the Qld Brigalow Belt but is not dominated by brigalow (Acacia harpophylla). It consists of landscapes derived from both extensive basalt flows and quartz sandstones and consequently has very variable soils and vegetation depending on the local rock type or sediment source (Drewitt and Langston, 2006).

The Bioregion's bedrock comprises horizontally bedded Jurassic and Triassic quartz sandstone and shale with limited areas of conglomerate or basalts. Some of the sandstone at the heads of streams forms a low but rugged topography of cliffs and small plateau features. Streams follow the direction of major joint planes in the narrow sandstone gorges, depositing colluvial fans of coarse sands and gravels in the wider valleys (Drewitt and Langston, 2006).

Even further down valley the topography is more subdued, partly buried in alluvial debris and largely eroded to rolling plains. Evidence of larger stream courses of Quaternary age occur in the long, sand-filled channels and clay plains with gilgai, or shallow depressions between ridges in which rainwater collects (Drewitt and Langston, 2006).

The Liverpool Range is the largest lava field province in NSW, dated between 32 and 40 million years, with up to 400 m thickness of basalt covering an area of over 6,000 km^2. The lava fields did not have a central volcanic vent but erupted from multiple fissures (Drewitt and Langston, 2006).

Soils

Soils vary greatly across this topography, as do microclimate and aspect, so it is necessary to differentiate areas of hill tops and plateau from slopes and valley floors in both sandstone and basalt areas as all of these factors affect the vegetation (Drewitt and Langston, 2006).

The sandstone ridge tops carry thin, discontinuous soils with stony, sandy profiles and low nutrient status. Downslope, texture contrast soils (soils that have a sharp increase in texture, i.e. increase in clay content, on passing from surface soil layers to subsoil) are more common and are typically found with harsh clay sub-soils, while in the valley floors sediments tend to be sorted into deep sands with yellow earthy profiles, harsh grey clays, or more texture contrast soils with a greater concentration of soluble salts (Drewitt and Langston, 2006).

In basalt country the hill tops have stony, red or brown, well-structured clays with high nutrient values. Similar but often thicker soils are found on the slopes and the valley floors where they too accumulate clay materials.

Topography and Terrain

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. The site has higher elevations in the northern portion with spot heights in excess of 1,100 m and slightly decreases in elevation to the south.

The Liverpool Range is characterised by undulating plateau tops with steep margins grading to long foot slopes while the Talbragar Valley contains residual rocky hills, undulating long slopes and wash plains, wide valley floors with sandy streams (Drewitt and Langston, 2006).

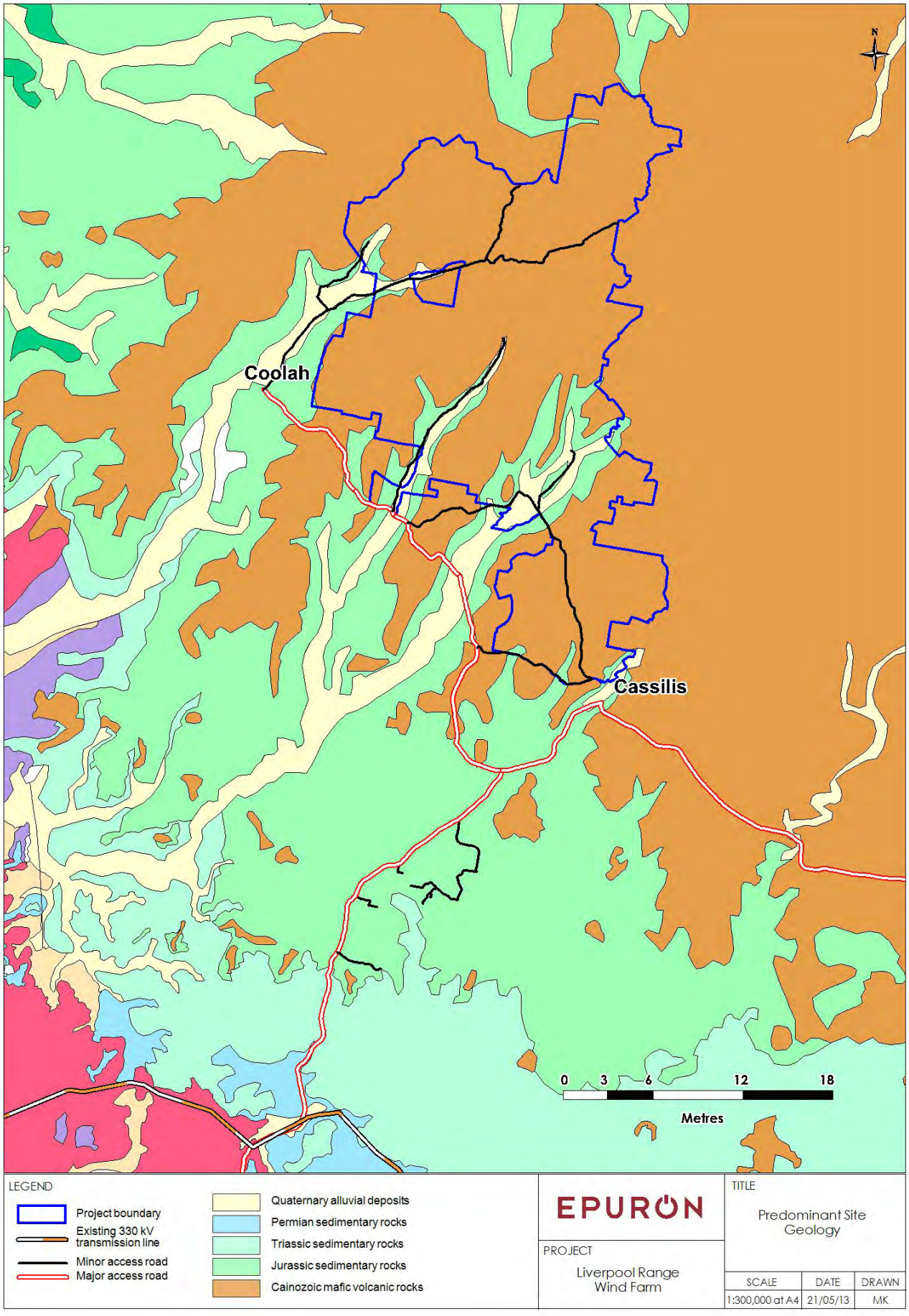

Figure 16-1 Geology of the local area

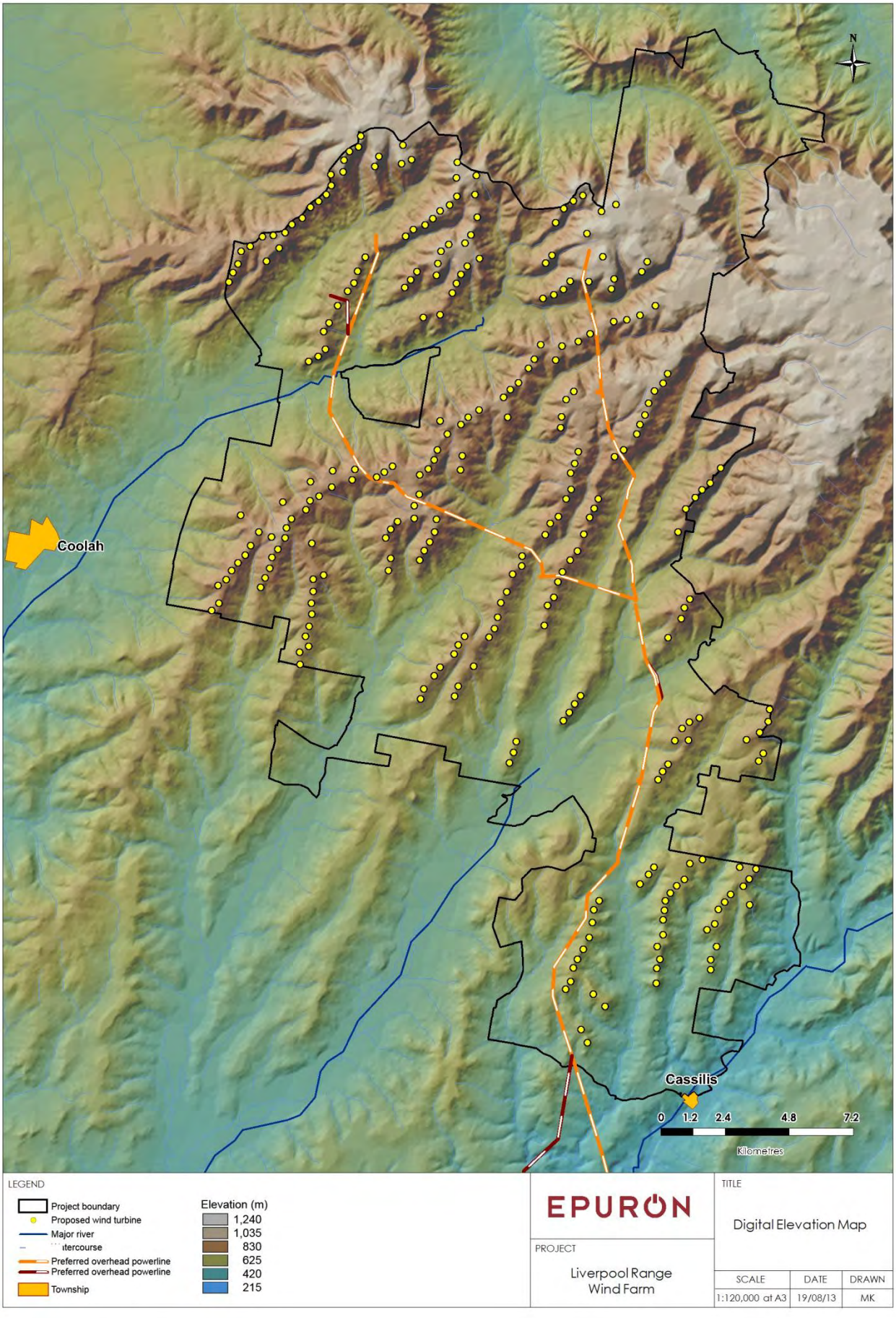

Figure 16-2 Digital elevation model of the Liverpool Range Wind Farm

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 sites 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 dryland 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 generally be restricted to the elevated ridgelines of the site, in areas 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 plant 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 timing of 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

Climate

The proposed Liverpool Range Wind Farm lies within the Brigalow Belt South Bioregion in northern NSW and southern Qld, extending from south of Dubbo in central-western NSW to the mid-Qld coast. The Bioregion has a total area of 27,196,933 hectares. A subhumid climate, with no dry season and a hot summer, characterises the south-eastern section of the Bioregion, while a generally dry subtropical climate dominates to the northwest. Minor patches to the southeast of the Bioregion fall within the temperate zone, with no dry season and a warm summer. To the far west of the Bioregion and in the outlier enclosed within the Darling Riverine Plains Bioregion, the climate can be described as hot and semi-arid (Drewitt and Langston, 2006).

Table 16-1 Brigalow Belt South climate summary (Drewitt and Langston, 2006)

South Eastern Highlands Bioregion - climate variable information	
Mean annual temperature range	10 to 19°C
Minimum monthly temperature range	-2.1 to 4°C
Maximum monthly temperature range	18 to 31.3°C
Mean annual rainfall range	449-1015 mm
Minimum average monthly rainfall	23-75 mm
Maximum average monthly rainfall	53-120 mm

Air Quality

The wind farm site is not located near any major industrial areas while parts of the powerline route running south from the wind farm site are proximate to existing mining operations. The wind farm site is located in the vicinity of the Golden Highway which is assumed to receive medium traffic volumes in any period of time. Due to the rainfall patterns in the region and the wind farm sites geographical distance from industry, the area has low levels of air borne particulate pollution. The general vegetation throughout the area will also assist in minimising air borne particles compared to drier, more barren parts of NSW.

16.2.1 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 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:

- production of concrete at onsite batching plant;
- 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 to fossil fuels.

16.2.2 Mitigation

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

The following measures are recommended to reduce the chance of dust and emission 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 are found to be ineffective for the control of dust (i.e. prevailing strong winds), work may be suspended as a precautionary measure until conditions are suitable for recommence.

16.3 Mineral Exploration

Geologically, the area proposed for the Liverpool Range Wind Farm lies in the Gunnedah Basin and forms the central part of the Sydney-Gunnedah basin which extends along the eastern margin of Australia. The Gunnedah Basin is a foreland basin with sediments unconformably overlying deformed and metamorphosed Ordivician to Devonian Lachlan Fold Belt strata in the west and abutting Devonian to Carboniferous New England Fold Belt strata to the east, along the east dipping Hunter-Mooki Thrust. The boundary between the Gunnedah Basin and the Sydney Basin, to the south, is argued as being either the Mount Coricudgy Anticline or the Liverpool Range. While the Mount Coricudgy Anticline is a structural boundary, sedimentation typical of the northern Sydney Basin appears to continue north of the anticline. Whereas, it is said that the depositional character of the sediments change across the Liverpool Range in the west of the basins (Brett Lane & Associates, 2009).

There are currently five 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***	*Consultation Method*	*Response to Consultation*
AUTH 286	The Director General NSW Department of Trade and Investment, Regional Infrastructure and Services (TIRIS) on behalf of the Crown	Coal Title Authorisation	Written Post Letter	Email Response. No issues raised.
EL 7597	ABX1 Pty Ltd	Group 1 Mineral Exploration	Written Post Letter	No response to follow up consultation
EL 5918	Dronvisa Pty Ltd	Group 5 Mineral Exploration	Written Post Letter	No response to follow up consultation
ML 1219	Dronvisa Pty Ltd	Mining Lease	Written Post Letter	No response to follow up consultation
PEL 12	Australian Coalbed Methane Pty Ltd	Petroleum Exploration Licence	Written Post Letter	No response to follow up consultation
PEL 433	Eastern Star Gas Pty Ltd	Petroleum Exploration Licence	Written Post Letter	Phone call response. No issues raised.
PEL 456	Macquarie Energy Pty Ltd	Petroleum Exploration Licence	Written Post Letter	No response to follow up consultation
EL7963	Merriwa West Pty Ltd	Mineral Exploration	Phone call, as specified by Trade & Investment	No response to follow up consultation

Exploration licenses entitle the holder to carry out exploration and prospecting for minerals and petroleum within the specified area. Lease boundaries are shown on and overlap a portion of the site perimeter.

Epuron has consulted with these licence holders and provided detailed maps showing the proposed location of wind farm infrastructure. At the time of writing no response had been received from the above mentioned licence holders.

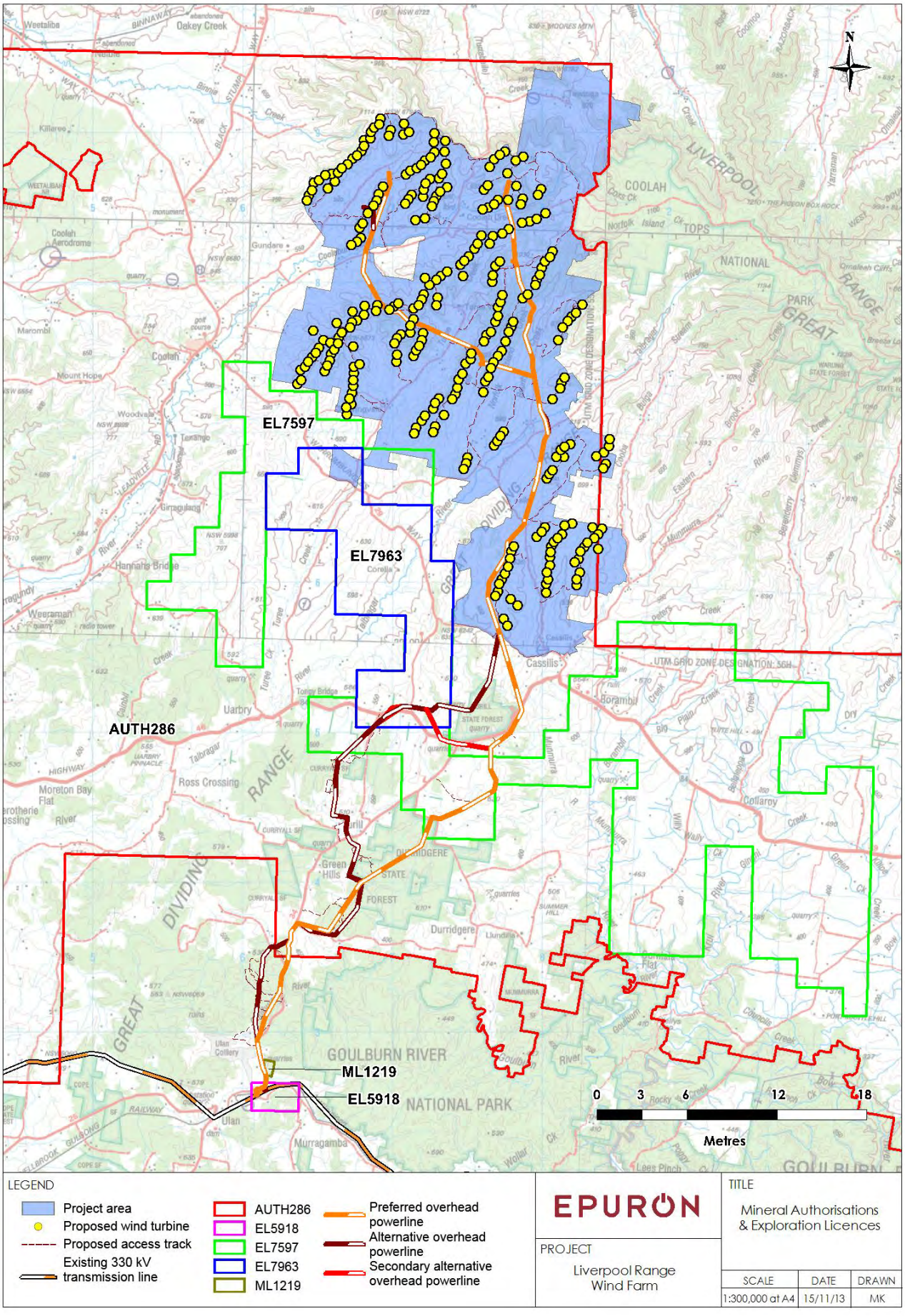

Figure 16-3 Current Mineral Authorisations and Exploration Licenses across the project site

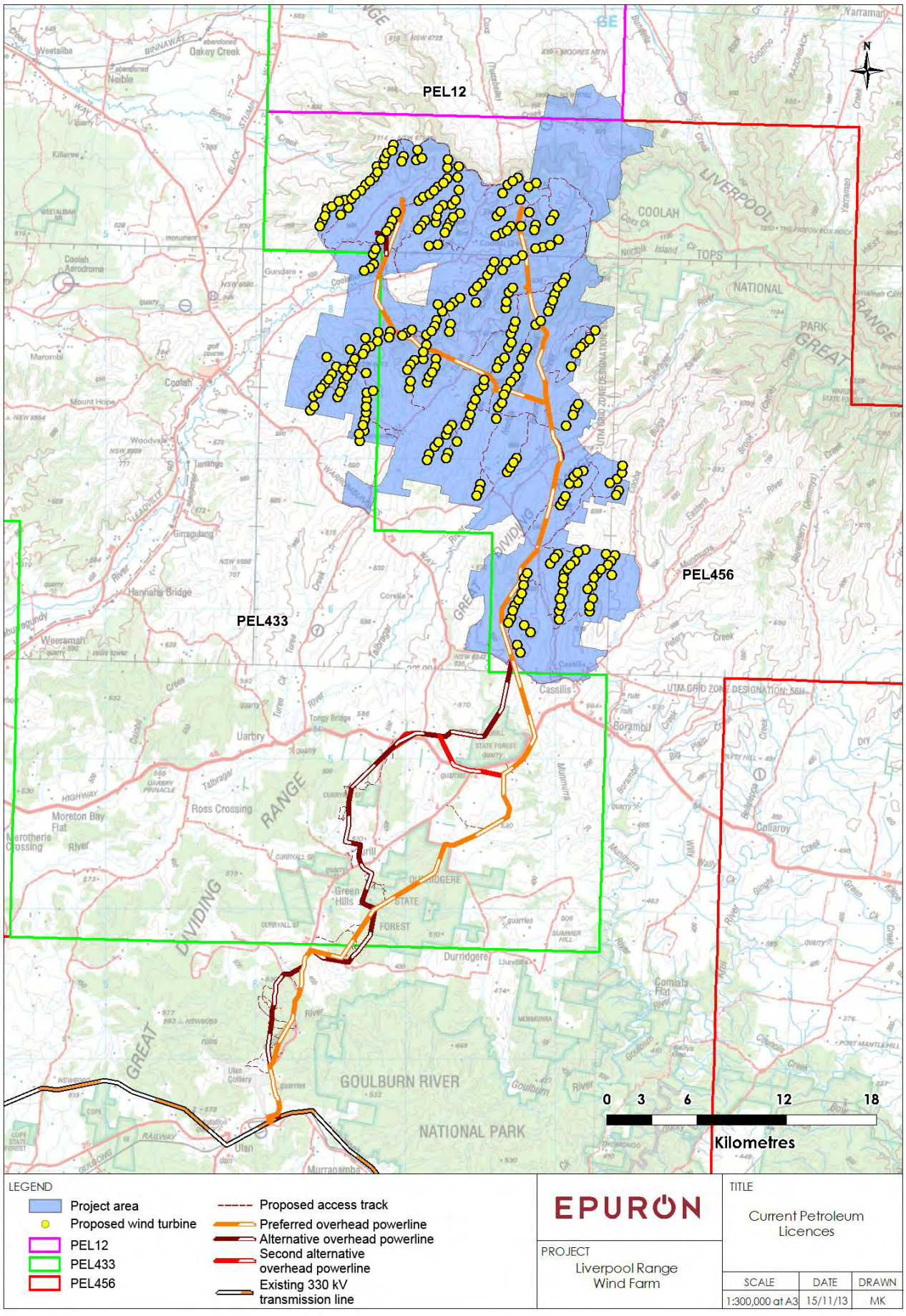

Figure 16-4 Current Petroleum Licenses across the project site

16.3.1 Assessment

There is no reason why the exploration of minerals and petroleum could not occur concurrently with the operation of wind turbines as the direct footprint of the wind farm infrastructure is a very small percentage 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. 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 can 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 will be provided to the exploration licence holders prior to construction. Ongoing consultation will be maintained to ensure that the Proponent is 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 Liverpool Plains, Mid-Western, Upper Hunter and Warrumbungle Local Government Areas (LGA). The key statistics pertaining to the LGAs are provided in Table 16-3 (DECCW, 2010c; MacMahon, 2010; Roaring 40s, 2010; CCA, 2012).

Table 16-3 Key statistics for the four LGAs

People and Population	***Liverpool Plains***	***Mid-Western***	***Upper Hunter***	***Warrumbungle***
Area of the LGA (km^2)	5,085	2,848	8,103	12,380
Population number	7,880	3,548	13,785	10,323
% Growth since 2004	0.0%	-1.3%	3.0%	0.1%
Median age group	35 – 44 years	45 – 54 years	35 – 44 years	35 – 44 years
Income and Occupation of Local Population				
Average income	$33,937	$40,566	$40,839	$32,041
Managers	26.2%	6.1%	7.3%	30.7%
Labourers	15.4%	18.5%	19.4%	14.3%
Professionals	11.2%	13.6%	12.1%	12.9%
Tradesperson and related workers	11.1%	13.1%	15.6%	11.0%
Clerical and administrative workers	10.4%	15.7%	15.2%	7.9%
Gross value of agricultural commodities ($m)				
Value of crops	61.4	-	8.5	35.6
Value of livestock slaughtering	91.7	-	49.6	53.7

Value of livestock products	3.6	-	13.5	13.9
Total	156.6	-	71.6	103.2

The major industries sectors within the region are agriculture, viticulture, tourism and retail which reflect the predominantly rural nature of the area. The area supports a wide range of beef cattle, sheep and lambs due to its large amounts of cleared agricultural land and rainfall levels. The four LGAs 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 accommodation 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 Liverpool Range Wind Farm and the results can be seen in Table 16-4.

Table 16-4 Local, State and Australian construction expenditure for a 864 MW wind farm ($million)

Construction Expenditure	*Local / Regional*	*State*	*Australia*
Wind turbine generators	$165.9	$554.7	$824.3
Site administration and design	$20.7	$69.1	$102.8
Site construction works	$20.7	$69.1	$102.8
Site electrical works	$23.3	$76.9	$114.0
Labour	$25.9	$85.5	$127.0
Total construction	$256.6	$856.2	$1,272
Local operational expenses (annual)	$17.3	$26.8	$61.3

Using the estimations from this report, it is anticipated that $259 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 contracted during the site development. These may include concreting, earthworks, steel works and electrical cabling. As well, other service-related employment would follow, with the provisions for food, fuel, accommodation and other services for the contractors. Based on the construction phase spanning 24-36 months, employment would likely increase by up to 829 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 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 impacts 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 $2.3

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	$742,100
Food	$1,113,100
Fuel	$445,300
Total	$2,300,300

The construction and decommissioning phases of the project would take place over a considerable time period (estimated to be 24-36 months for construction and approximately 12-24 months for decommissioning). There is potential to adversely impact the current grazing activities on the sites 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 impacts 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 78 annual full time equivalent jobs in the local region for the life of the wind farm.

16.5 Economic Resource Impacts

The project would require natural resources from the Coolah - Cassilis 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 and wind turbine foundations 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

In the likely event that pre-mix concrete is unable to be supplied for the turbine foundations and other facilities, up to four portable concrete batching plants would be established on site.

A typical concrete batch plant would involve a level area of approximately 100m by 100m 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 350m^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 required to be 5-6 m wide 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 to be 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 foundations, where possible, or from existing sand and gravel pits within the local area. Every effort would be made to source clean sands and aggregates and 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	359,200 m	718,400 m^3
Construction compounds	300 m x 300 m x 400 mm	4	144,000 m^3
Hardstand areas	25 m x 45 m x 400 mm	288	129,600 m^3
Total volume			1,050,050 m^3
Estimated Rock Extracted from Foundations	512 m^3	288	147,456 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 25 m x 25 m and 2-3 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 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 400m^3 foundation*	*Required for 288 turbine foundations*
Cement	13%	125 tonnes	36,000 tonnes
Sand	34%	325 tonnes	93,600 tonnes
Aggregate	46%	441 tonnes	127,008 tonnes
Water*	7%	67 kL	19,296 kL
TOTAL:	100%	958 tonnes	275,904

*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 and will be supplied primarily from rain water collected from facility roof drainage. Should additional water be required, it will be sourced from local water sources and delivered by truck to the site.

It is proposed that concrete for the turbine foundations be either provided from a portable source or a purpose built batching plant (with sufficient capacity to allow an entire foundation to be constructed in one pour). Accordingly, approximately 67 kL 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 67 kL to site will require approximately 4 trucks.

It is anticipated that in total 28,000 kL of water would be required for the turbine foundations and 31,000 kL for dust suppression (assuming 2 water trucks per day for 300 days). That equates to a total of about 59,000 kL of water for the construction phase. If this water was entirely sourced from external sources the total number of truck movements required would be 3,687 in each direction.

The sourcing of treated water would help to minimise the amount of water 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 the areas surface water and/or groundwater quality or quantity.

16.6 Wastes

Waste generated from the Liverpool Range Wind Farm is predicated to be minimal and will be confined to the construction and decommissioning stages of the project. During the operational stage, there will be very limited waste generated.

A key strategy of the construction and decommissioning works is to avoid and minimise waste from the construction site, reuse and recycle waste where possible and dispose appropriately of waste which cannot be managed in any other way. This is the application of the Waste Hierarchy which states that:

- Strategies which try to avoid products becoming waste are generally preferable to
- Strategies which seek to find a use for waste, which are in turn generally preferable to
- Strategies for disposal which should be used as a last resort.

The proponent would prepare a Waste Management Plan (WMP) as part of the Construction Environment Management Plan (CEMP). The WMP would identify all potential waste streams associated with the project. The WMP would also outline methods of disposal of waste at appropriately licenced facilities.

16.6.1 Assessment

Table 16-8 below identifies the waste streams generated by the project and includes examples and management strategies.

Table 16-8 - Waste Streams for the Liverpool Range Wind Farm

Waste Stream	Generation Process	Example of Waste Type	POEO Classification	Management Strategy	Waste Storage	Approximate Quantity
Office Waste	General office activities	Paper, plastics, packaging, cartridges, polystyrene	General Solid (non-putrescible)	Provide separated recycling and non-recyclable bins onsite.	A mixed recycling bin would be provided and located within the site office compound.	Negligible*
Office Waste	General office activities	Food	General solid (putrescible)	Provide separate waste bins on site for food waste. Regular collection of this waste will be undertaken with the collected waste disposed of at an appropriately licensed facility.	A food scraps bin would be provided and located in the site mess room.	Negligible*
Packaging	General construction activities	Timber pallets, plastic, steel strapping, cardboard	General Solid (non-putrescible)	Provide separated recycling bins onsite for recyclable material. Provide general waste bins for non-recyclable materials.	A recycling bin would be provided and located within the designated lay down area.	Negligible*
Construction Activities	Excavation and earthworks	Excess spoil	General Solid (non-putrescible)	Reuse onsite, if unable to re-use on site dispose of at appropriately licensed land fill.	Any excess material would be stockpiled on site.	Negligible*
Construction Activities	Vegetation clearing	Excess cleared vegetation	General Solid (non-putrescible)	Non weedy material would be mulched and used during rehabilitation.	Any excess material would be disposed of at an appropriately licensed facility.	Negligible*
Construction Activities	Vegetation clearing	Excess cleared vegetation	General Solid (non-putrescible)	Weedy vegetation would be sprayed and bagged to avoid potential proliferation.	This material would be disposed of at an appropriately licensed facility.	Negligible*
Construction Activities	Construction materials	Formwork, reinforcing steel, PVC conduits, cables	General Solid (non-putrescible)	Ensure this waste is not mixed with any other waste. Provide separated bins onsite.	This material would be stockpiled on site and removed by an appropriately licensed waste contractor.	Negligible*
Construction Activities	Construction materials	Cable reels	General Solid (non-putrescible)	All cable reels would be stored on site and returned to the manufacturer.	Cable reels would be stored on site within the lay down area.	Zero waste. All reels returned to manufacturer.

Waste Stream	Generation Process	Example of Waste Type	POEO Classification	Management Strategy	Waste Storage	Approximate Quantity
Construction Activities	Concrete Truck Wash out	Concrete laden water	Liquid waste	Washout waster would be contained within a concrete wash out bay. This water has a high pH and high turbidity. The water component of the waste water is left within settling ponds to evaporate. The resulting waste is concrete sludge.	A dedicated concrete wash facility would be located in the close vicinity of each turbine. Concrete sludge would be re-used for road base aggregate or disposed as inert waste to an appropriately licensed land fill.	<~4 ML of water evaporated on site. Negligible amounts of concrete sludge generated.
Construction Activities	Sewage	Sewage	Liquid waste	Sewage waste generated onsite would be stored within toilet tanks.	The sewage would be collected and transported by a transport company licensed to transport sewage waste.	Negligible*
Construction Activities	Use of chemicals	Empty drums and storage containers	Classification dependant on chemical stored	Drums and containers would be stored in an appropriately bunded hardstand area.	This material would be disposed of at an appropriately licensed facility.	Negligible*
* Negligible – Refers to a quantity of waste that is small or unimportant to the point where it is not worth considering. In the context of this project it is considered to be less than 1 ML in total.						

Where possible, waste generated by the project will be recycled or reused on site. For example, excavation spoil and crushed rock from the construction of construction compounds, access tracks and turbine foundations will be reused for the base layer for access tracks on the site where possible. Dust covers and wooden cable drums used for transporting turbine blades and wiring would be reused. Packaging materials will be stored for recycling at the on-site construction compound. All wastes would be removed by contractors and maintenance staff. No local garbage service is expected to be required.

There will be very limited to nil dangerous sharps or toxic waste from the project. The majority of waste described above would be classified as general solid waste (non-putrescibles) in accordance with the POEO Act. Sanitary wastes would also be generated within the ancillary facilities and site compound during the construction period. This waste would be classified as general solid waste (putrescibles) in accordance with the POEO Act.

16.6.2 Mitigation Measures

The proponent would prepare a Waste Management Plan (WMP) to be included within the CEMP. It would include but not be limited to the following:

- The scope for reusing and recycling waste materials;
- Provision for recycling would be made onsite;
- Wastes would be disposed of at appropriate facilities;
- Toilet facilities would be provided for onsite workers and sewage from contractors 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 foundations where possible. Surplus material would be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated.

16.7 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) then 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.

17 Draft Statements of Commitment

17.1 Environmental Management Plan

A management plan will be implemented for all mitigation measures. This will comprise of a Construction Environmental Management Plan (CEMP) and an Operation Environmental Management Plan (OEMP). Both plans would include performance indicators, timeframes, implementation and reporting responsibilities, communication protocols, a monitoring program, auditing and review arrangements, emergency responses, induction and training and complaint/dispute resolution procedures. Adaptive management would ensure that improvements were consolidated in the updated plans.

The key information that will be monitored is detailed in the CEMP and the OEMP. The CEMP is an overarching plan. It will provide the environmental management details for the construction phase of the project and applies to all activities undertaken by those involved in the construction. The CEMP will provide a framework for the management and control of activities in regards to environmental aspects and the key risks identified e.g. through an environmental work statement. As a result it will also form a basis to ensure measure compliance and ensure that non-compliance is identified. The CEMP will also describe how contractors will control the environmental aspects during construction and the review methodology, it will provide a framework in which environmental quality and performance outcomes can be measured against and substantiated. The CEMP will include the following key information and sub-plans:

- Community information management;
- Compounds and ancillary facilities management;
- Noise and vibration;
- Traffic and management;
- Soil and water quality management;
- Air quality and dust management;
- Aboriginal heritage management;
- Soil contamination, hazardous material and waste management;
- Ecological impact management; and
- Hazard and risk management.

The OEMP is similar to the CEMP except it is for the operation of the wind farm. The OEMP will monitor the following key information that will each have a sub-plan:

- Operational noise management;
- Landscape management;
- Bird and bat management;
- Weed and pest management;
- Safety management
- Telecommunication interference; and
- Decommissioning.

A hierarchy will be created to ensure project compliance, this will involve the: owners representative, operations manager, operations site supervisor, health safety quality manager, environmental representative consultant and the relevant agency. The hierarchy will ensure that reporting is conducted to the appropriate stakeholder and that any action required is implemented. Such reporting will include compliance reporting, compliance monitoring and audit, incident reporting, audit and improvement and compliance and corrective actions.

Compliance tracking will be undertaken periodically during operation and will be formally reported to DoPI. Reporting will involve a pre-operation compliance report, periodic environmental management reports and periodic evaluation and adaptive management reports.

In addition the OEMP will be formally reviewed periodically after the commencement of operation and periodically thereafter to ensure it is up to date and that changes to procedures and practices have been implemented according to the plan.

Both OEMP and CEMP will be required to be approved by the Director General. An independent audit will be undertaken by an independent person or team commissioned by the owner as part of the environmental audit process.

17.2 Statement of commitments

Under the Director General's Requirements, the proponent is 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.

Table 17-1 Draft Statement of Commitments

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 at surrounding residences	Mitigate impact	Prior to the commencement of construction consult with any residence within 2 km of a wind turbine regarding visual impacts. Consider appropriate mitigation measures, if required, including an offer for vegetative screening. The Proponent would write to the owner of each residence outlining the offer to consult and process. 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 landholders using specialist advice. An offer for vegetative screening would remain in place for a period of 1 year after project construction, to allow residence time to either adjust or to decide that landscape filtering or screening is warranted. Planting would be completed within 2 years of completion of project construction.	Post Construction	CEMP OEMP
4	Visual	Deterioration of visual amenity Blade glint	Mitigate impact	Ensure turbines are supplied with appropriate surface finish and colour, as recommended by the manufacturer, to minimise glint and reflected sunlight.	Design	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 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	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	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				Sunday and public holidays:Not currently proposed 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; 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.		
8	Noise	Construction noise	Minimise Impact	Apply all feasible and reasonable work practices regarding construction machinery 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).	Construction	CEMP
9	Noise	Construction noise	Mitigate Impact	Implement a community consultation process to ensure adequate community awareness and notice of expected construction noise.	Construction	CEMP
10	Noise	Construction noise	Minimise Impact	Locate fixed noise sources such as crushing plant at the maximum practical distance from the nearest dwellings and where possible use existing landforms to block line of sight between equipment and the dwelling.	Construction	CEMP
11	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

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
12	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
13	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
14	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
15	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 of all houses within 2km of a turbine and selected representative houses within 2-5km.	Operation	OEMP
16	Ecology	Loss or modification of habitat	Avoid, minimise, offset	Where areas of native vegetation and habitat cannot be avoided, microsite infrastructure to minimise impacts (includes road widening and powerline easement).	Detailed design	CEMP
17	Ecology	Loss or modification of habitat	Mitigate impact	Align access roads and underground electrical cabling along existing tracks where possible to minimise the number of easements and vegetation removal and the spread of weeds.	Detailed design	CEMP
18	Ecology	Loss or modification of habitat	Mitigate impact	Construct underground electrical reticulation and overhead powerlines along access road infrastructure where possible to minimise the number of easements and the potential for avian collisions	Detailed design	CEMP
19	Ecology	Loss or modification of habitat	Avoid, minimise, offset	Prepare and implement an Offset Plan, to offset the quantum and condition of native vegetation to be removed, in order to achieve a positive net environmental outcome for the project. Offset areas would reflect the actual footprint of the development (i.e. foundation areas and new tracks) not the maximum impact areas	Prior to construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				(which include easements and existing tracks). The Offset Plan would be prepared in consultation with OEH, prior to construction.		
20	Ecology	Loss or modification of habitat	Avoid, minimise, offset	Implement a post-construction bird and bat monitoring program to determine the impacts of the project on bird and bat populations	Prior to construction	OEMP
21	Ecology	Weed Control	Avoid Impacts	The CEMP would include appropriate weed control protocols. Such measures may include washing machinery after entering affected areas during wet periods and spraying road ways, where required, to ensure the spread of weeds is restricted during construction and throughout the ongoing operation of the project.	Construction	CEMP
22	Heritage	Disturb identified area	Avoid Impact	Protect identified Aboriginal and European sites that need to avoided during construction.	Detailed design & construction	CEMP
23	Heritage	Inadvertent disturbance of Aboriginal heritage sites or objects	Avoid Impact	All relevant staff and contractors should be made aware of their statutory obligations for heritage under NSW NPW Act (1974) and the NSW Heritage Act (1977), which may be implemented as a heritage induction.	Construction	CEMP OEMP
24	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
25	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
26	Communication	Deterioration of signal strength	Avoid impact	Locate wind turbines to avoid existing microwave link paths that cross the site or liaise with the owners of such links to relocate services to avoid potential impacts from turbines.	Detailed Design	CEMP
27	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. • Where investigations determine that the interference is cause by the wind farm, establish appropriate mitigation measures at each of the affected	Operation	OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				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.		
28	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
29	Shadow flicker	Safety & nuisance	Compliance	Appropriate mitigation measures will be negotiated and implemented, where necessary, including potentially 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
30	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
31	Traffic	Safety and asset protection	Minimise Impact	The Proponent would develop and implement a Traffic Management Plan (TMP) in consultation with roads authorities to facilitate appropriate management of potential traffic impacts. The TMP would include provisions for: • Scheduling of deliveries and managing timing of transport • Identifying 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 • 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 as required to be placed on roads that would be used primarily by construction traffic	Construction	CEMP OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• 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 • Provision of 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.		
32	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
33	Traffic	Safety and Asset protection	Minimise Impact	Prepare road dilapidation reports covering pavement and drainage structures in consultation with roads authorities for the route 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
34	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
35	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 the plans adequacy to manage bushfire risks during construction, operation and decommissioning. The plan would as a minimum include: • Details of flammable materials and ignition sources brought onto the site, such as hydrocarbons, to be handled and stored as per manufacturer's instructions. • During the construction phase, appropriate fire fighting equipment would be held onsite for use 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.	Construction Operation Decommissioning	CEMP OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• 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. • Overhead transmission easements would be periodically inspected to monitor regrowth of encroaching vegetation.		
36	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 20-40 metres of a major drainage line or water course, where practical.	Detailed design	CEMP
37	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
38	Hydrology	Deterioration of water quality (Surface Water)	Minimise Impact	Ensure all vehicles onsite follow established trails and minimise onsite movements, where possible.	Construction Operation	CEMP OEMP
39	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
40	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

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
41	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
42	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
43	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 affecting any areas of contamination.	Detailed design	CEMP
44	Soils and landforms	Soil quality	Minimise impact	The Proponent would prepare a protocol in the instance that contamination is 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
45	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
46	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
47	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
48	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
49	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 coordinate with local events.	Construction	CEMP
50	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

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
51	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, 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 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.	Operation	OEMP
52	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
53	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 possibly. 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
54	Agriculture	Impact on current land use	Minimise impact	Ensure that the switchyard and substation is appropriately fenced to eliminate stock ingress.	Operation	OEMP
55	Agriculture	Impacts on current activities	Minimise impact	If aerial agriculture activities are demonstrated to be materially disrupted 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 pre-wind farm aerial agricultural activities and a reasonable alternative method.	Operation	OEMP
56	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:	Construction	CEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				• Inductions for all contractors requiring site access. • Ensure all staff are appropriately qualified and trained for the roles they are undertaking.		
57	Health and Safety	Safety of persons or stock	Minimise Impact	Appropriate safety measures will be implemented in accordance with good industry practice and relevant legislation to ensure risk to the general public is mitigated, including clear marking of hazards and restricting access to public where required	Construction and Decommissioning	CEMP
58	Climate	Air quality	Minimise Impact	A cost benefit analysis would be completed on differing potential mitigation options for dust suppression, for inclusion in the CEMP.	Construction	CEMP
59	Climate	Air quality	Minimise Impact	Undertake ongoing visual dust monitoring and suppression (if required) during the construction phase. Monitoring would regularly assess the effectiveness of dust suppression activities. Monitoring would regularly assess the effectiveness of dust suppression activities.	Construction	CEMP
60	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.	Construction	CEMP
61	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
62	Climate	Air quality	Minimise Impact	Should blasting be required, it would be carried out in accordance with all relevant statutory requirements and residences within 1km of blasting activities would be informed prior to blasting	Construction	CEMP
63	Climate	Air quality	Minimise Impact	Dust filters would be installed on silos, where required	Construction	CEMP
64	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	Construction Operation	CEMP OEMP

SoC	Issue	Impact	Objective	Mitigation tasks	Project phase	Auditing
				aggregate for foundations where possible. Surplus material would be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated.		
65	Environmental Management	Quality Assurance	Compliance	Appoint a representative as a key contact for all environmental management issues.	Construction Operation	CEMP OEMP
66	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
67	Environmental Management	Quality Assurance	Operational monitoring and Compliance	Will implement a compliance and monitoring programme against permit conditions.	Operation	OEMP
68	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
68	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 proposed Liverpool Range Wind Farm, a project capable of generating around 846 MW of renewable energy.

The project has incorporated the environmental constraints identified during the assessment process and demonstrated how these 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 have been converted into 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 Assessment (Flora and Fauna); and
- Indigenous and Cultural 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 2,724,700 MWh of electricity per year - sufficient for the average consumption of around 340,600 homes.
- It would improve the security of electricity supply through diversification of generation locations.
- It would reduce greenhouse gas emissions by approximately 2,634,800 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 contribute to the NSW Government's target of reducing greenhouse gas emissions by 60% by the year 2050.
- It would inject funds of up to $1,272 million into the Australian economy.
- It would create local employments opportunities of up to 829 jobs during construction and up to 78 permanent jobs during the operational lifetime of the project.

The conclusion of the individual key issue assessments is that the proposed Liverpool Range 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 Liverpool Range 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 Environment's Director General's Requirements.
DP&E	NSW Department of Planning and Environment (previously DP&I)
DP&I	NSW Department of Planning and Infrastructure (now DP&E)
DPI	Department of Primary Industries
EA	This Environmental Assessment report
EEC	Endangered Ecological Community
EMF	Electromagnetic fields
EMP	Environmental Management Plan

Abbreviation	*Description*
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
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

Abbreviation	*Description*
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)
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 and authored 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

Brian Hall and Michael Kurnik of Epuron constitute the document's primary authors. The information contained in this document is neither false nor misleading. All information is considered by the authors to be correct at the time of writing.

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Attachment 1 – Detailed Site Maps

Attachment 2 – Involved Landowner Parcels

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