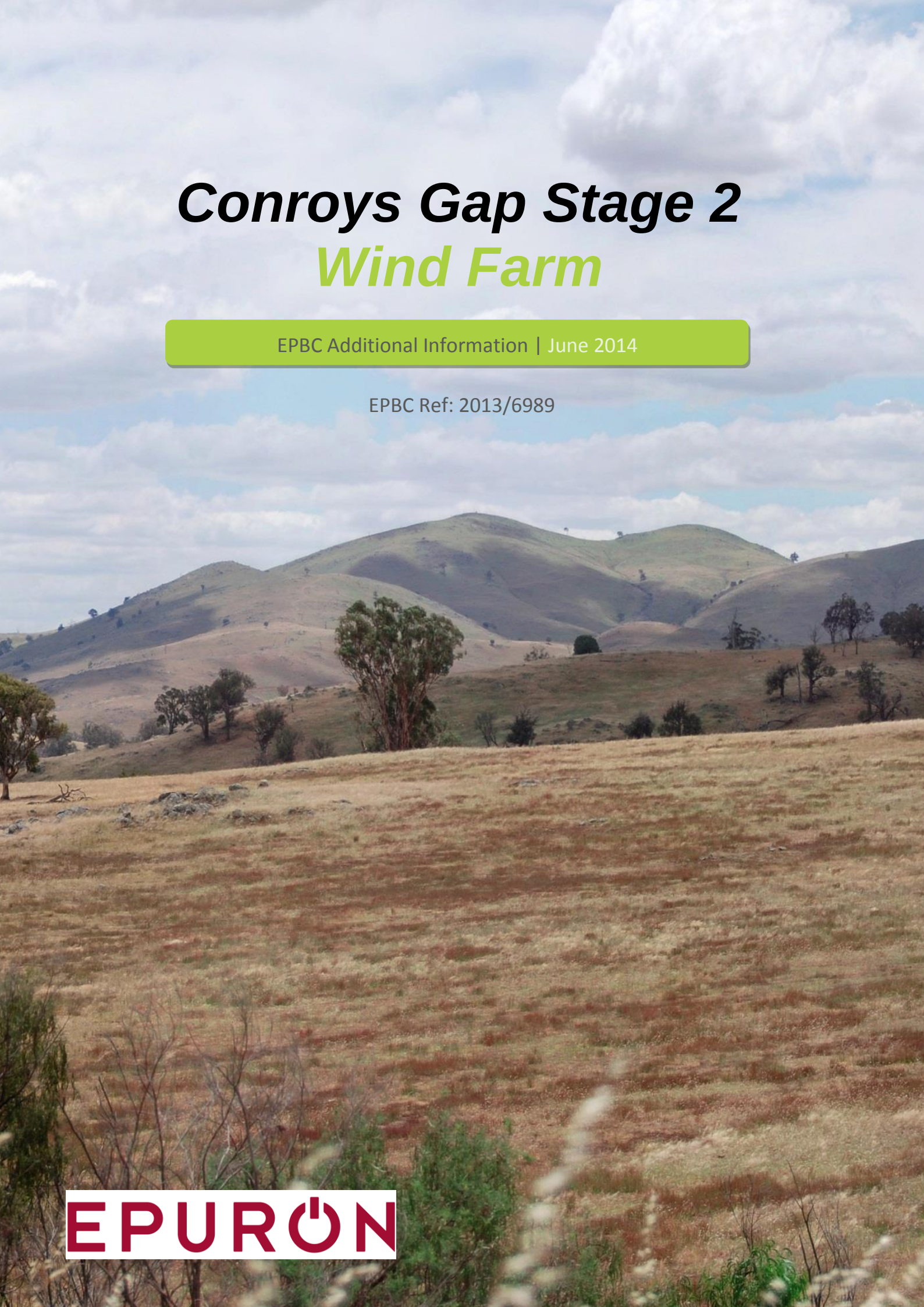
Conroys Gap Stage 2
Wind Farm

EPBC Additional Information | June 2014

EPBC Ref: 2013/6989



EPURON

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1 Background Information

The Conroys Gap Stage 2 Wind Farm proposal is for the development of a wind farm in the Southern Tablelands region of NSW, approximately 17 km west of Yass and around 300 km west of Sydney.

A referral for the project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was lodged on 5 September 2013. The Department of the Environment determined that the proposed action was a controlled action on 17 January 2014 and requested further information in order to be able to assess the relevant impacts of the action. This Additional Information report provides the additional information in accordance with the specific format requested by The Department of the Environment by letter dated 30 January 2014.

1.1 Background Information on the Purpose & Need for the Proposal

As presented in the EPBC referral to the Department of the Environment on 5 September 2013, the Conroys Gap Stage 2 Wind Farm proposal would involve the construction and operation of a wind farm. The proposal includes:

- Up to 18 wind turbines;
- Internal site access tracks and minor upgrades to existing public roads required for the installation and maintenance of the wind turbines; and
- Electrical connection between the turbines using underground power lines.

Additional temporary construction activities and infrastructure such as a temporary construction compound, concrete batching plant and storage areas would be required during the construction and refurbishment phases.

The Conroys Gap Stage 2 Wind Farm would provide the following primary benefits:

- In full operation, it would generate more than 142,000 MWh of electricity per year - sufficient for the average consumption of around 17,700 homes.
- It would improve the security of electricity supply through diversification of generation locations.
- It would reduce greenhouse gas emissions by approximately 137,200 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 create local employment opportunities (up to 43 jobs during construction and 4 operations and maintenance jobs) and inject funds of up to $66 million into the Australian economy and $13 million into the local economy.

In addition to these primary benefits there are also secondary benefits and opportunities for improvement in infrastructure, tourism and ecology.

1.2 Contextual Information on Other Proposed or Operating Wind Farms in the Area

The Conroys Gap Stage 2 Wind Farm Proposal falls within the ACT/NSW Border Region Renewable Energy Precinct. The precincts are a State Government developed initiative to encourage community partnership in areas where significant future renewable energy development – especially wind farms – is expected with the aim of giving local communities a voice and a stake in renewable energy development (OEH, 2013).

There are currently four proposed wind farm developments and one approved, yet not constructed, within the Yass region (see Figure 1-1):

- Bango Wind Farm – 200 MW
- Conroy's Gap Wind Farm (approved) – 30 MW
- Rugby Wind Farm – 166 MW

- Rye Park Wind Farm – 378 MW
- Yass Valley Wind Farm – 315 MW

An EPBC Referral (Ref 2013/6810) for the Bango Wind Farm was submitted on 28 March 2013 and included a Significant Impact Assessment for the Superb Parrot. The assessment found that the proposed action would not significantly impact on the Superb Parrot. The proposed Conroys Gap Stage 2 Wind Farm is unlikely to have a significant impact on the Superb Parrot. The cumulative impact from the wind farms is also not likely to have a significant impact on the Superb Parrot (Refer section 4.1.4 of this report).

The Conroys Gap Stage 2 Wind Farm (this referral 2013/6989) action adjoins the Yass Valley Wind Farm (referral 2013/7002) action but is likely to have a separate owner and slightly different construction timeframe.

The Conroys Gap Stage 2 and Yass Valley Wind Farm actions are progressing through the NSW State Planning process as a single project – the Yass Valley Wind Farm but due to the differing nature of these two approvals and their associated liability for compliance (State planning approval runs with the land and EPBC determinations are provided to the Proponent), the 126 wind turbine Yass Valley Wind Farm is being referred separately.

Refer Figure 2-7 for a map showing the boundaries of the Conroys Gap Stage 2 and Yass Valley Wind Farm actions.

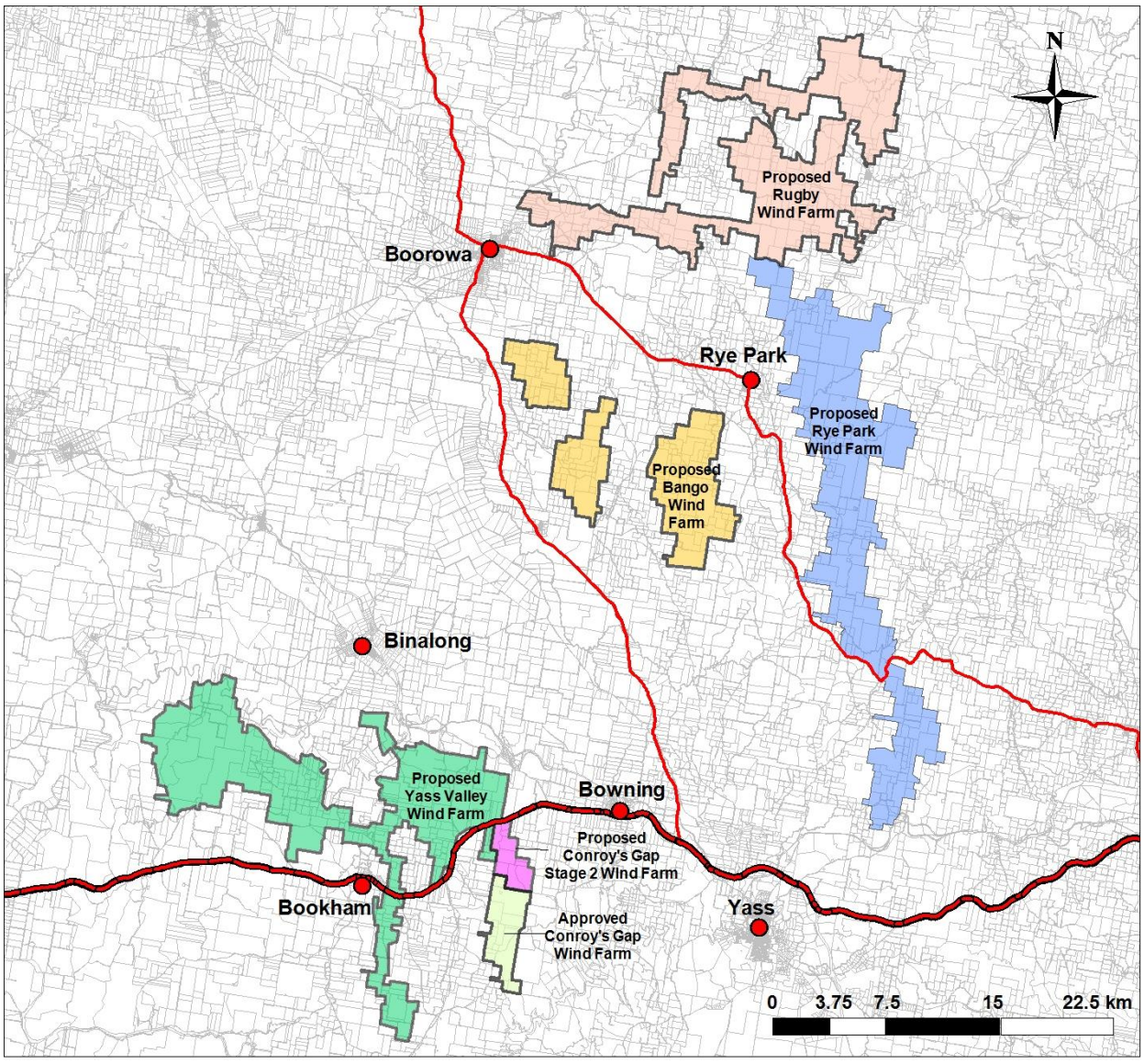

Figure 1-1 Approved and proposed wind farms near the Conroys Gap Stage 2 Wind Farm

1.3 Objectives of the Proposal in relation to Government Strategies

1.3.1 State Renewable Energy Targets

In 2006 the NSW Government committed to reduce greenhouse gas emissions by 60% by 2050 (DECCW, 2009). In considering this level of reduction to the power generation sector in NSW, we should note:

- By 2030 energy consumption is expected to rise by 29% in the state (ABARE, 2010).
- Achieving a 60% reduction in emissions, whilst doubling our electricity use, requires an >70% reduction in greenhouse gas emissions per unit of electricity generated.
- Even if our entire fossil fuel power generation fleet was converted to natural gas, this would not even halve our existing level of emissions, and do nothing to address growth.
- Accordingly, to achieve this target, as a minimum all of our electricity growth over the next 40 years must be met with zero emission power sources.
- Wind energy is currently the most economic zero emission power source.

The Draft NSW Renewable Energy Action Plan 2012 supports the national target of 20% renewable energy by 2020. In 2011 renewable generation in NSW was 7.8%. The plan promotes the use of energy from renewable sources at least cost to the energy consumer and with maximum benefits to NSW. The Plan cites Bureau of Resources and Energy Economics statistics 2012 indicating that wind is presently the second lowest cost renewable technology behind biogas (landfill), and that wind is predicted to be the least cost renewable source of electricity beyond 2030.

The proposed Conroys Gap Stage 2 Wind Farm supports the Draft NSW Renewable Energy Action Plan 2012 objective of 20% renewable energy by increasing the supply of electricity from wind, the most economical form of large-scale renewable energy.

1.3.2 Federal Renewable Energy Target

The Australian Government's Mandatory Renewable Energy Target (MRET) scheme was established in 2001 to expand the renewable energy market and increase the amount of renewables being utilised in Australia's electricity supply. The MRET advocated that an additional 2%, or 9,500 GWh, of renewable energy was to be sourced by 2010 (DCC, 2009).

In August 2009 the Federal Government introduced a revised renewable energy scheme. The Renewable Energy Target (RET) is an expansion of the MRET and required an additional 45,000 GWh of electricity (approximately 20% of Australia's total electricity supply) to be sourced from renewable projects by 2020 (DCC, 2009). This requires an additional 8,000 - 10,000 MW of new renewable energy generators to be built across Australia in the next decade.

In February 2010 the Federal Government amended the RET scheme by dividing the renewable sources into two categories, the small-scale renewable energy generators and large scale renewable energy generators. The purpose of this move was to ensure continued ongoing investment in large scale renewable energy projects (i.e. those projects greater than 30 MW).

Epuron estimates that around one third of the renewable energy generation required to meet this target will need to be built in NSW, and predominantly be supplied by wind generation.

The Conroys Gap Stage 2 Wind Farm would have a generation capacity of 45 MW (based on a 2.5 MW turbine) and would contribute directly to the RET.

1.3.3 Existing assessment documents

Two ecological assessment documents have been prepared by **ngh**environmental for the Conroys Gap Stage 2 Wind Farm and include:

- Marilba Hills Precinct Biodiversity Assessment (Marilba BA) (July 2009a)
- Supplementary Ecology Report (SER) – Yass Valley Wind Farm (November 2012)
    - This report assessed impacts on new areas added to the project as well as updating impact area calculations for the entire project, based on the revised infrastructure layout.

1.4 Relation to Other Actions

As discussed in section 1.2, the Conroys Gap Stage 2 proposal is located on the southeast border of the Yass Valley Wind Farm action (referral 2013/7002). This project has been submitted to the New South Wales Department of Planning and Infrastructure as a single project; however it is possible that the two actions will be developed and operated by two separate entities.

Yass Valley Wind Farm was deemed a controlled action and an Additional Information report for the project was submitted to the federal Department of the Environment on 16th January 2014.

Conroys Gap Wind Farm Stage 1 is located to the south of the Conroys Gap Stage 2 proposed action. It was determined to be a non-controlled action on 26th May 2006.

2 Description of the Action

The main components of the proposed Conroys Gap Stage 2 Wind Farm included in this application are:

- Up to 18 wind turbines consisting of three blades, a rotor hub and nacelle mounted on a tubular steel tower together with the associated turbine foundation, turbine transformer and crane hardstand area.
- A medium voltage electrical reticulation network of above ground and underground cabling to connect the individual wind turbines.
- Internal site access tracks and minor upgrades to existing public roads to allow the delivery of the wind turbine components and other equipment.
- A permanent wind monitoring mast.
- Temporary construction facilities including offices, facilities, car parking, equipment laydown areas and concrete batching plants.

A range of wind turbines is being considered for the project with a capacity between 1.5 and 3.6 megawatts. For consistency of presentation the calculations used throughout this report have used a wind farm capacity of 45 MW based on a typical 2.5 MW turbine.

2.1 Full Scope of Works

2.1.1 Permanent Infrastructure

2.1.1.1 Wind Turbine

Epuron has not yet selected the turbine model to be used for this project. A number of turbines are under consideration for the proposal, each with varying characteristics including physical dimensions and technical attributes, production capacity and cost considerations.

In general, different characteristics of turbine models require different turbine layouts, however to simplify the environmental assessment of the project, an indicative layout has been developed that reflects the characteristics of a large range of turbine models. For the purpose of assessing the wind farm impacts, Epuron bases its assessment on understanding both typical and worst-case impacts likely from the range of turbines under consideration.

Wind Turbines

The wind turbines under consideration have a typical hub height of 78 m – 100 m and a typical blade length of 40 m – 56 m (or 80 m – 112 m overall rotor diameter). The tallest wind turbine tip height combination under consideration is 150 m. An example of a wind turbine can see seen in Figure 2-1.

Each wind turbine would be a three bladed type of the “up-wind” design, meaning that the blades face into the wind and in front of the tower and nacelle. This design reduces noise levels generated during operation.

Each wind turbine would have a rated power capacity of between 1.5 MW and 3.6 MW, subject to final turbine selection.

Nacelle

The nacelle is the housing at the top of the tower that encloses the generator, gearbox (unless direct drive), and control gear including motors, pumps, brakes and electrical components. This control gear ensures that the wind turbine always faces into the wind, and adjusts blade angles to maximise power output and minimise blade noise. The nacelle also houses winches to assist in lifting maintenance equipment or smaller replacement parts to the nacelle.

The nacelle design takes into account acoustic considerations to minimise noise emissions from mechanical components.

Tower

The tower is of tubular steel or concrete construction typically 78-100 m high, tapering from around 5-6 m in diameter at the base to around 3-4 m at the top. Exact dimensions would depend on the wind turbine design selected. The tower is constructed in up to five sections, each section bolted or welded together via an internal flange arrangement. Within the core of the tower are the power and control cables and an access ladder or mechanical person lift to the nacelle (with safety climb system).

Access Tracks, Hardstands and Footings

The tower would be mounted on a reinforced concrete footing and would require removal of rock and subsoil at the base of each turbine. A number of footing design options are under consideration including a gravity footing (where subsoil geology is less stable) and a rock-bolted footing (where subsoil geology provides good bedrock). A combination of these footing designs may be used on the site depending on the geology identified at each turbine location.

Each wind turbine would require an access track and electrical cabling to the site collection / connection substations. Access tracks would be a minimum of 5-6 m wide (wider at bends and passing lanes) and be all weather graded gravel tracks. Hardstand areas required beneath each turbine would be approximately 22 m x 40 m (880 m^2). The shape and exact size of the hardstand area is subject to final turbine selection and crane lifting requirements. The hardstand area is used for delivery and storage of turbine components, assembly of the turbine components and for the turbine installation cranes. A typical layout of a hardstand area can be seen in Figure 2-2.

Access tracks and hardstands areas would generally be left in situ after construction to allow for any required maintenance and repairs.

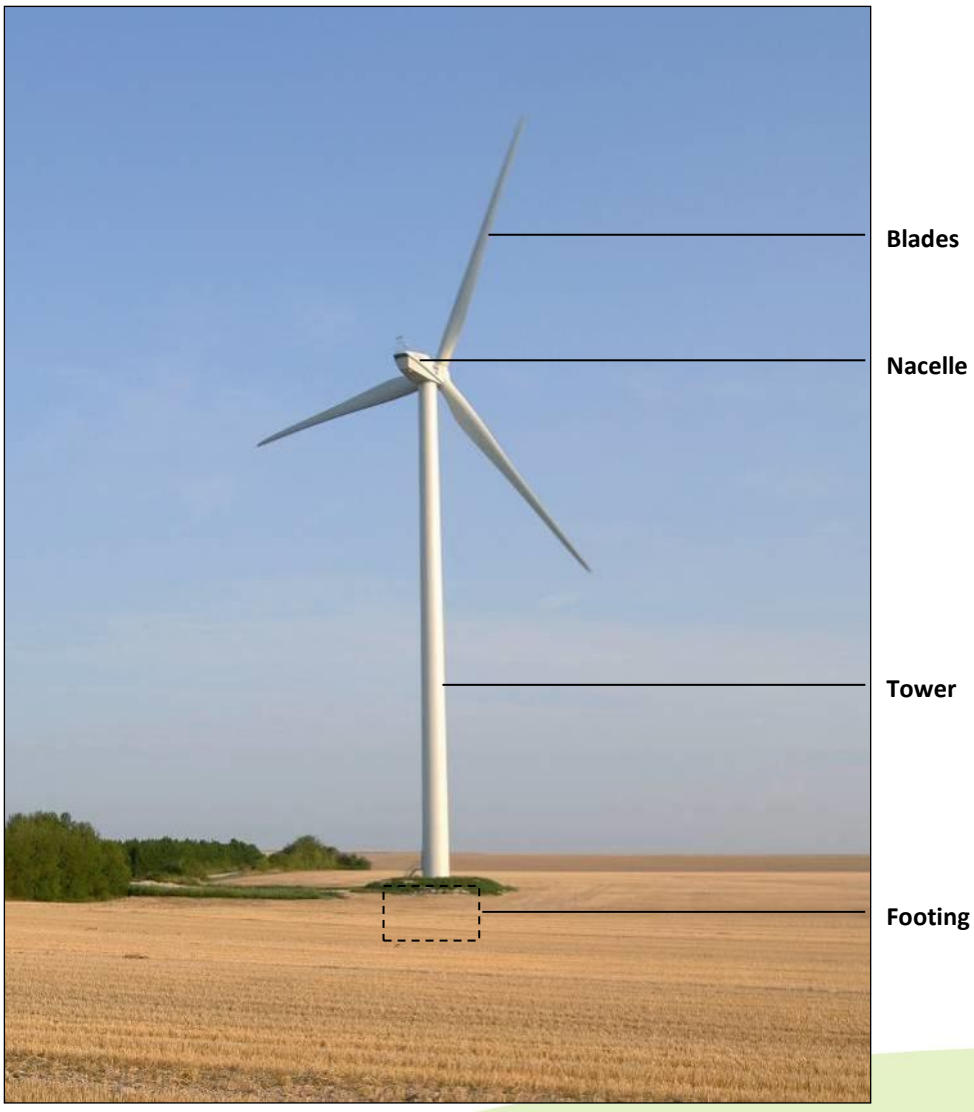

Figure 2-1 Typical wind turbine installed on an 80m tower (Photo courtesy REpower Systems AG)

Transformer

Each wind turbine generator would produce power at typically 690 V, and up to 1,000 V. Power is then transformed at each wind turbine to either 22 kV or 33 kV for reticulation around the site. The transformer for each wind turbine would be located either within the base of the tower, in the nacelle, or externally adjacent to the tower as a small pad-mount transformer, depending on the specific wind turbine model selected. The transformer would be either a dry-type transformer, or would be suitably bunded.

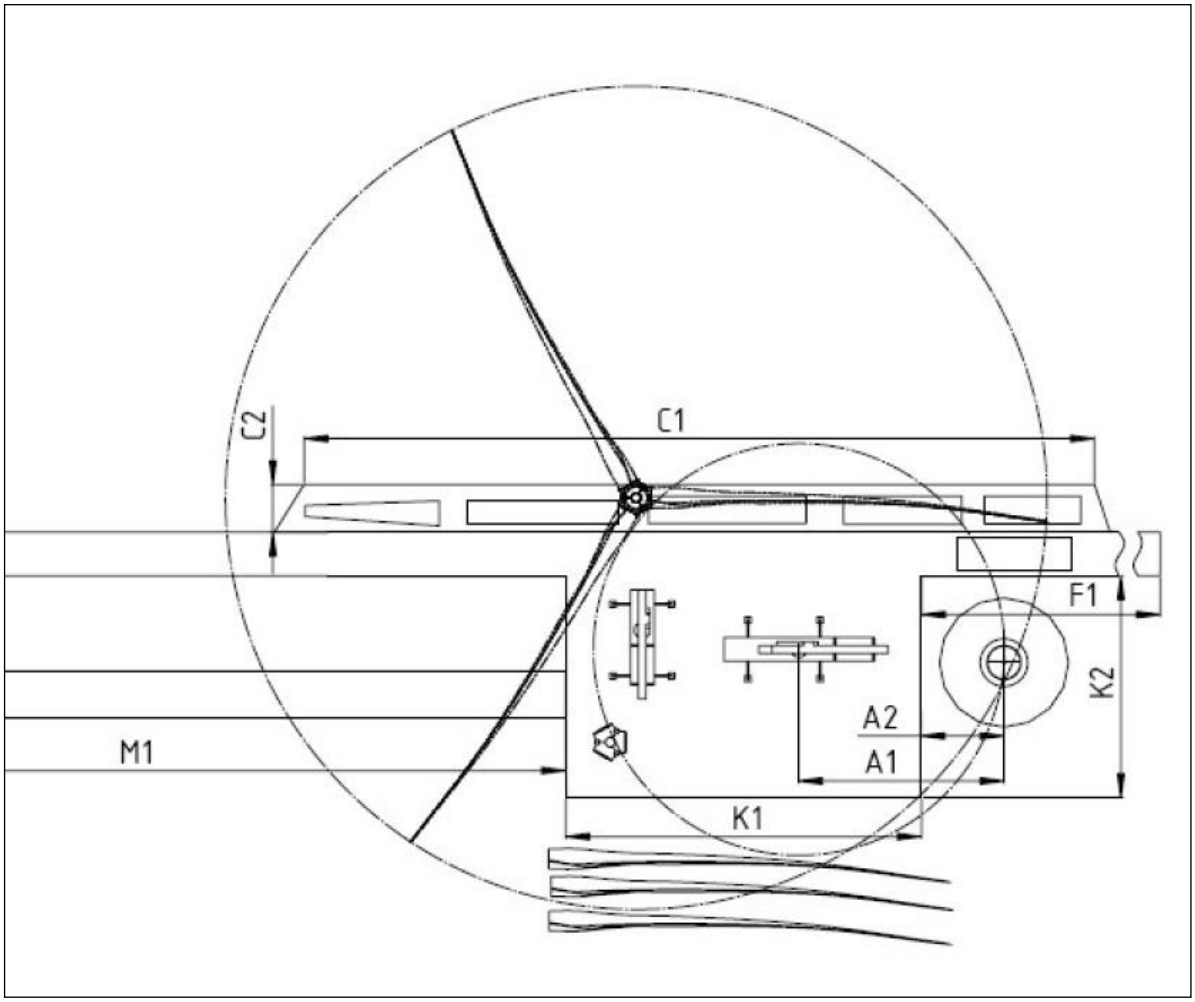

Figure 2-2 Example crane hardstand area (Source: REpower)

2.1.1.2 Onsite Electrical Reticulation

From each wind turbine, the power voltage is stepped up from generation voltage to either 22 kV or 33 kV for either underground or overhead reticulation cabling from each group of turbines to the collection substations.

In general, overhead cabling offers benefits as it minimises ground disturbance and is significantly lower in cost. There are practical limitations installing overhead cabling on ridges where turbines are located, as well as increased visual impact.

Typically underground cabling is used to connect turbines along the ridgelines and overhead cabling is used to transport power between adjacent ridges and from groups of turbines to the collection substations. Cable trenches would, where practical, be dug within or adjacent to the onsite access tracks to minimise any related ground disturbance. Short spur connections would diverge from the main cable route which would approximately follow the main access route at each group of turbines. Subject to ground conditions underground cables would require a trench of 0.75 – 1 m deep and be typically 0.3 – 1 m wide.

2.1.1.3 Communications

A suitable communications network will be established across the wind farm site to enable appropriate operation and control including the required interaction with the TransGrid electricity grid. This may involve underground, overhead or microwave communication systems.

2.1.1.4 Control and Communication Cabling

In addition to the electrical cabling, control and communications cabling is required from the maintenance facility to each wind turbine, and to the various substations. This communication cabling is typically optical fibre cable and would be installed using the same method and route as the power cabling described above, that is, strung from the same poles as overhead lines, or buried in the same cable trench as the electrical cables.

2.1.1.5 Wind Monitoring Equipment

Epuron is currently operating a temporary wind monitoring mast on the site to assess wind speeds at or near proposed turbine locations. Following construction, a permanent wind monitoring mast would be required to assist the control and operation of the wind farm. These would be either static guyed or un-guyed structures and will be to a minimum height of the wind turbine hubs with remotely operated wind monitoring equipment installed at multiple heights on each mast.

Pending final wind turbine placements, it may be necessary to move or install additional temporary wind monitoring masts to verify wind speeds across the site.

2.1.2 Temporary Infrastructure

During the construction phase a construction compound will be established on or adjacent to the site. The compound will include car parking, site offices, and amenities for the construction work force, and lay down areas for the temporary storage of construction materials, plant, equipment and wind turbine components. A temporary power supply will be required to be connected to the construction compounds.

Site Offices

During the construction phase up to 43 staff would be working on site at any time. Suitable locations for site offices would be selected, avoiding areas that are regarded as having environmental constraints. The site offices may include several demountable buildings and amenities blocks located on site for the duration of construction. Sufficient parking would be provided for the expected usage.

Rock Crushing

Materials excavated during the construction of wind turbine footings may be able to be reused for other purposes such as road base for the access roads and upgrades. Mobile rock crushers would be used for these purposes during construction.

Concrete Batch Plant

During construction a concrete batching plant may be required on site and would typically be located proximate to the construction compound. A typical concrete batch plant would involve a level area of approximately 75 x 100 m to locate the loading bays, hoppers, cement and admixture silos, concrete truck loading hardstand, water tank and stockpiles for aggregate and sands. The batching plant would include an in-ground water recycling / first flush pit to prevent dirty water escaping onto the surrounding area, and would be fully remediated after the construction phase. The concrete batching plant would produce around 400 m^3 of concrete per day when a turbine foundation is being poured. The operational period would be for 3 - 4 months and would produce around 850 tonnes of concrete per day. This is equivalent to around 15,000 tonnes of concrete during the construction phase for foundations.

2.1.3 Fencing

New gates will be provided where turbine access tracks cross existing fence lines to enable existing farming practices to continue as before the construction of the wind farm. Some temporary fencing will be required during the construction period to minimise disruption to farming practices during construction. Appropriate security fencing will be provided at substation and switchyards and at the main access points to the wind farm from the public road network.

2.1.4 Stockpiles of Materials

Generally construction materials (road base and gravel) for the construction of access tracks and concrete for wind turbine foundations will be sourced from the materials excavated from turbine foundations and cut in the preparation of the access tracks. Depending on the geotechnical conditions encountered on the site, some temporary storage of construction materials will be required.

2.1.5 Stormwater Diversions & Erosion Control

An Erosion and Sediment Control Plan will be developed as part of the Construction Environment Management Plan prior to the commencement of any construction activities.

2.1.6 Environment Rehabilitation Works

A draft Decommissioning and Rehabilitation Plan has been prepared which sets out the process for environment rehabilitation works to be carried out at the end of the operational life of the wind farm which is expected to be 30 years.

2.2 Locations of Off-Site Infrastructure

2.2.1 Connection to the Electricity Grid

To export power from the wind farm, it is necessary to connect the wind turbines to the national electricity grid. This is achieved through a combination of underground and overhead electricity cables connecting the turbines to a nearby substation and switchyard. A new 132 kV wind farm connection switchyard is likely to be located in the Conroys Gap Stage One development area to connect the wind farm into the existing 132 kV TransGrid Yass – Wagga Wagga transmission line located at the south of the site.

2.2.2 Road Upgrades

2.2.2.1 Site Access

Two site access points have been identified, primary access from the approved Conroys Gap Stage One development area off Paynes Road and a secondary access or egress from the truck stop at Conroys Gap on the Hume Highway.

2.3 Description of Construction Methods, Techniques and Materials

Prior to the commencement of construction works a Construction Environmental Management Plan (CEMP) will be prepared to the satisfaction of the relevant authorities to manage and mitigate environmental impacts on the wind farm site. The CEMP will incorporate all relevant processes and mitigation measures for development activity and will include:

- Traffic and Transport;
- Erosion & Sediment Control Plan;
- Landscape Management Plan;
- Soil & Water Management;
- Chemical and Fuel Storage - to avoid pollution of surface and ground waters;
- Fire Management;
- Rail Safety Management Plan;
- Waste Generation and Disposal; and
- Additional measures mentioned in the Statement of Commitments.

Prior to the commencement of permanent wind farm operations an Operational Environmental Management Plan (OEMP) will be prepared to the satisfaction of the relevant authorities to manage and mitigate environmental impacts on the wind farm site. The OEMP will incorporate all relevant processes and mitigation measures for wind farm operations and will include:

- Health and Safety;
- Community and Communications
- Waste Generation and Disposal; and
- Additional measures mentioned in the Statement of Commitments.

2.4 Description of Operational Requirements and Maintenance Works

While the wind farm operation would be controlled remotely, the wind turbines and other equipment would require regular maintenance. It is possible that some equipment may require major repair or replacement. During the initial operating years, operator attendance may be more regular while wind farm operation is being fine-tuned and optimised.

Once installed, the turbines would operate for an economic life of twenty to thirty years. After this time the turbines may be refurbished/replaced to improve their performance or decommissioned and removed from the site.

Routine Maintenance

To ensure the wind farm operates in a safe and reliable manner, it would require regular inspection and maintenance on an 'as needs' basis. This would generally be carried out using standard light vehicles.

In addition, regular scheduled maintenance is required, generally at 3, 6 and 12 monthly intervals. As a guide, each turbine requires approximately 7 days of maintenance per year. This does not require the use of major equipment, and could be carried out in a normal utility or small truck and would not require any additional works or infrastructure.

Major Repairs

It is possible that major unexpected or unscheduled equipment failures could take place during the life of the wind farm. While wind turbines and electrical components are designed for a 20 - 30 year life, failures can occur, for example due to lightning strike.

Most repairs can be carried out in a similar manner to routine maintenance, with some exceptions:

Replacement of wind turbine blades, if necessary, would require bringing new blades to the affected turbine and installation of these blades using large cranes. The requirements are similar to the construction phase, and the access tracks established for construction would be used.

Replacement of wind turbine generators or gearboxes may require a crane and low loader truck to access the wind farm.

Replacement of substation transformers would require a low loader truck to access the site.

Site monitoring program

A post-construction monitoring program would be established to determine any additional impacts resulting from the operation of the wind farm. The Operational Environmental Management Plan would contain specific monitoring programs required and would assess key issues such as noise compliance.

2.5 Anticipated Duration and Timing

The establishment of the wind farm can be considered as occurring in four phases. These include construction, operation, refurbishment and/or decommissioning of the wind farm. A description of activities under these headings follows.

2.5.1 Phase 1: Wind Farm Construction

The construction phase of the wind farm is likely to occur over a 6 - 9 month period and would include activities such as:

- transportation of people, materials and equipment to site;
- civil works for access track construction, turbine and monitoring mast footings and trenching for cables;
- establishment, operation and removal of any required construction equipment such as rock breaking equipment and concrete batching plants;

- potential use of blasting in foundation excavation, if required;
- installation of wind turbines using large mobile cranes;
- construction of site substations, connection to on-site 330kV transmission line, and onsite overhead powerlines and electrical cables;
- construction of additional facilities (temporary and permanent) as required;
- construction, use and removal of temporary offices and facilities;
- temporary storage of plant, water, aggregates and other equipment; and
- restoration and revegetation of disturbed onsite areas on completion of construction works.

In general, construction would commence with site establishment, construction of access tracks and all other site civil works, including preparation of hardstand areas, and laying of cables. This would be followed by preparation of concrete footings, which must be cured prior to installation of wind turbines and monitoring masts.

Wind turbine construction and erection can be relatively fast once the footings are prepared, with wind turbines installed at a rate of approximately 2-3 per week, subject to weather. The towers are erected in sections, the nacelles lifted to the top of the towers, and finally blades lifted and bolted to the hub or preassembled on the ground and lifted as a unit.

The necessary substation construction and grid connection works would be carried out in parallel.

The commissioning phase would include pre-commissioning checks on all high-voltage equipment prior to connection to the TransGrid transmission network. Once the wind farm electrical connections have been commissioned and energised, each wind turbine is then separately commissioned and placed into service.

On completion of construction, remaining disturbed areas would be remediated and all waste materials removed and disposed of appropriately.

2.5.2 Phase 2: Wind Farm Operation

Ongoing wind farm operations have been detailed in Section 2.4.

2.5.3 Phase 3: Wind Turbine Refurbishment / Replacement

The life of a modern wind turbine is typically 20 - 30 years, at which point individual wind turbines would be refurbished, replaced, overhauled or removed. Individual turbines may also fail at shorter duration for various reasons as discussed above.

Replacement, refurbishment and recommissioning would involve similar road access arrangements to construction, and would require access for large cranes and transport vehicles to dismantle and remove the existing turbines and to install replacement turbines.

Existing substations and cabling would be largely reused. It is also possible that the existing footings and towers could also be reused, subject to the design of turbines available at the time of replacement / recommissioning. This would allow a significant cost saving for the wind farm.

Any refurbishment or turbine replacement would comply with the ongoing requirements of the project approval under this application.

2.5.4 Phase 4: Wind Farm Decommissioning

Decommissioning the wind farm at the end of its commercial life is the proponent's obligation and cost. It would involve reinstating similar road access arrangements to construction, and would require access for large cranes and transport vehicles to dismantle and remove the turbines and associated infrastructure. All underground infrastructure such as foundations and cable trenches would remain in situ and all above ground infrastructure would be removed. Some infrastructure such as access roads and buildings may be required by the landowner to remain in place after decommissioning and will not be removed. The decommissioning period is likely to be significantly shorter and with significantly fewer truck movements than the construction phase.

2.5.5 Staging of Works

It is possible that not all turbines, access tracks or other equipment outlined in this EA would be ultimately required for the project. Likewise, market, seasonal, or operational requirements may mean that the actual construction of the wind turbines may occur in stages or groups over a number of years.

Construction works packages, such as civil and electrical works, may be required to commence at different times or in stages as a result of receiving certain final development approvals or certifications to commence at different times.

2.5.6 Construction hours

In general, construction activities associated with the project that would generate audible noise in excess of the requirements of the NSW Industrial Noise Policy at any residence would be undertaken during the daylights hours of:

Monday – Friday: 7am – 6pm

Saturday: 7am – 3pm

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 and seasonal impacts.

However, some activities (including delivery to site of major equipment, and turbine installation) may occur outside of these hours due to logistic or weather related reasons.

Turbine crane lifts, for example, can only be carried out during periods of lower wind speeds because of operational limitations with the tall cranes and it is possible that out of hours work would be required for this purpose. This scenario has occurred at other wind farms (for example Cape Bridgewater, Victoria) where night crane operations have been required because of strong winds occurring during the day.

Likewise, the requirements of NSW Police or roads authorities may limit transport of major equipment to and from the site to outside of normal working hours.

2.6 Location, Boundaries and Size of Disturbance Footprint

The proposed wind farm requires the construction of a number of elements including turbines, turbine foundations, underground and overhead powerlines, substations, control buildings and access roads on the site.

During the construction activities, additional areas of the site would be impacted to provide construction compounds, concrete batching plants and storage areas. These areas can be rehabilitated and restored following the completion of the construction program. Table 2-1 presents the calculated area of the site impacted by the project based on the turbine layout. Some of these impacts would be for the duration of the wind farm operation and some are temporary impacts during the construction phase.

Table 2-1 Development footprint and site disturbance areas

Project Components	*Typical Dimensions*	*Quantity*	*Total Area (ha)*
Turbine Footing and Hardstand#	25 x 25 m	18	1.3
Crane hardstand	22 x 40 m	18	1.6
Access and spur roads*#	10 m	8.7 km	8.7
Underground powerlines onsite**	1 m	8.2 km	8.2
Concrete batch plant (if required)	100 x 75 m	1	0.8
Construction compound, staging and storage areas (if required)	300 x 100 m	1	3.0

* Access tracks around the site are anticipated to be 5-6 metres in width, however, a 10 metre width has been used to assess the likely impact due to cut and fill operations in order to achieve the required slope and increased width needed at bends.
**The impact area associated with underground cables has been incorporated into the figures for access tracks.
Habitat permanently removed

2.7 Indicative Layout Plan of the Area

Refer map on following page.

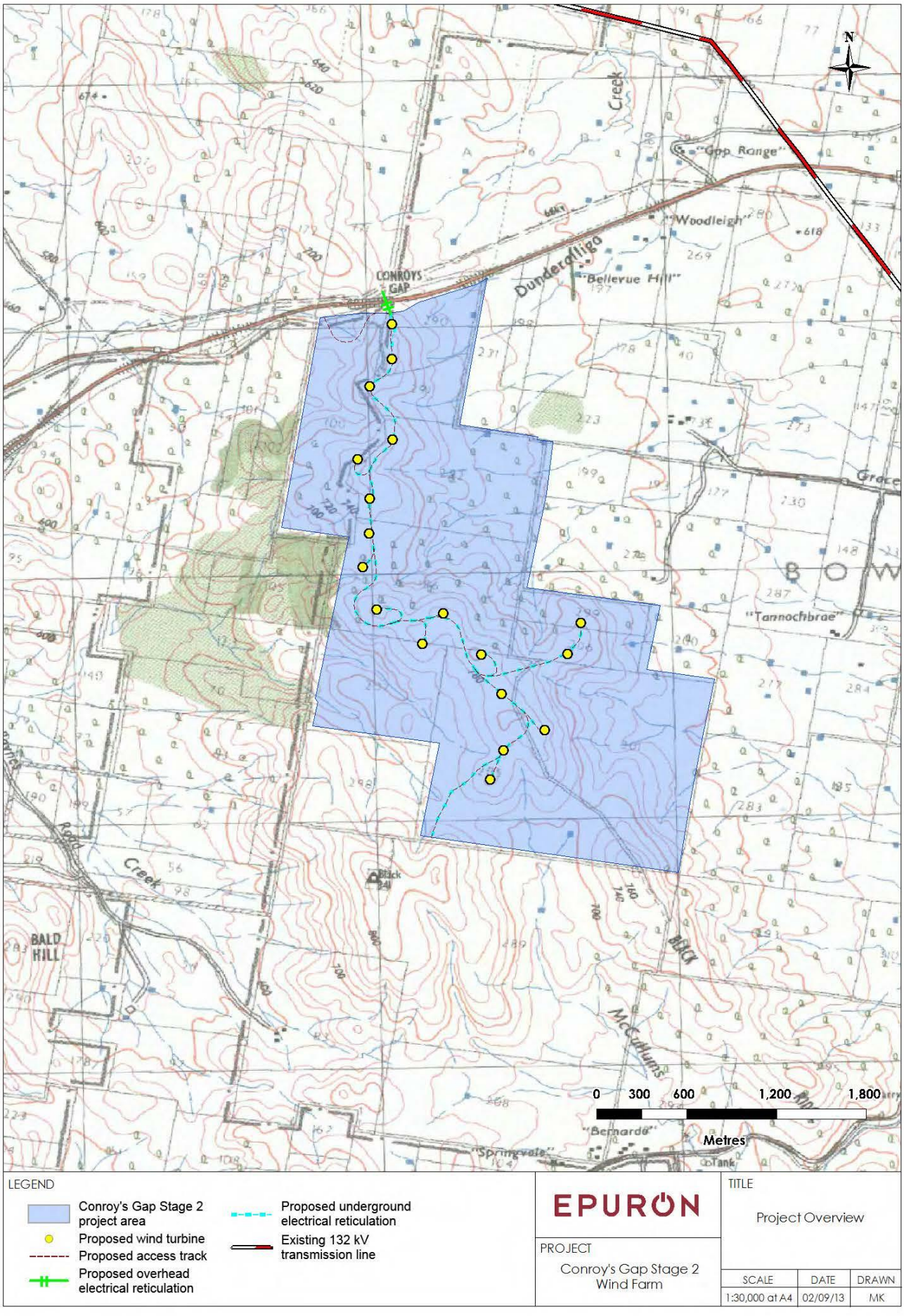

Figure 2-3 Conroys Gap Wind Farm Stage 2 proposed project layout

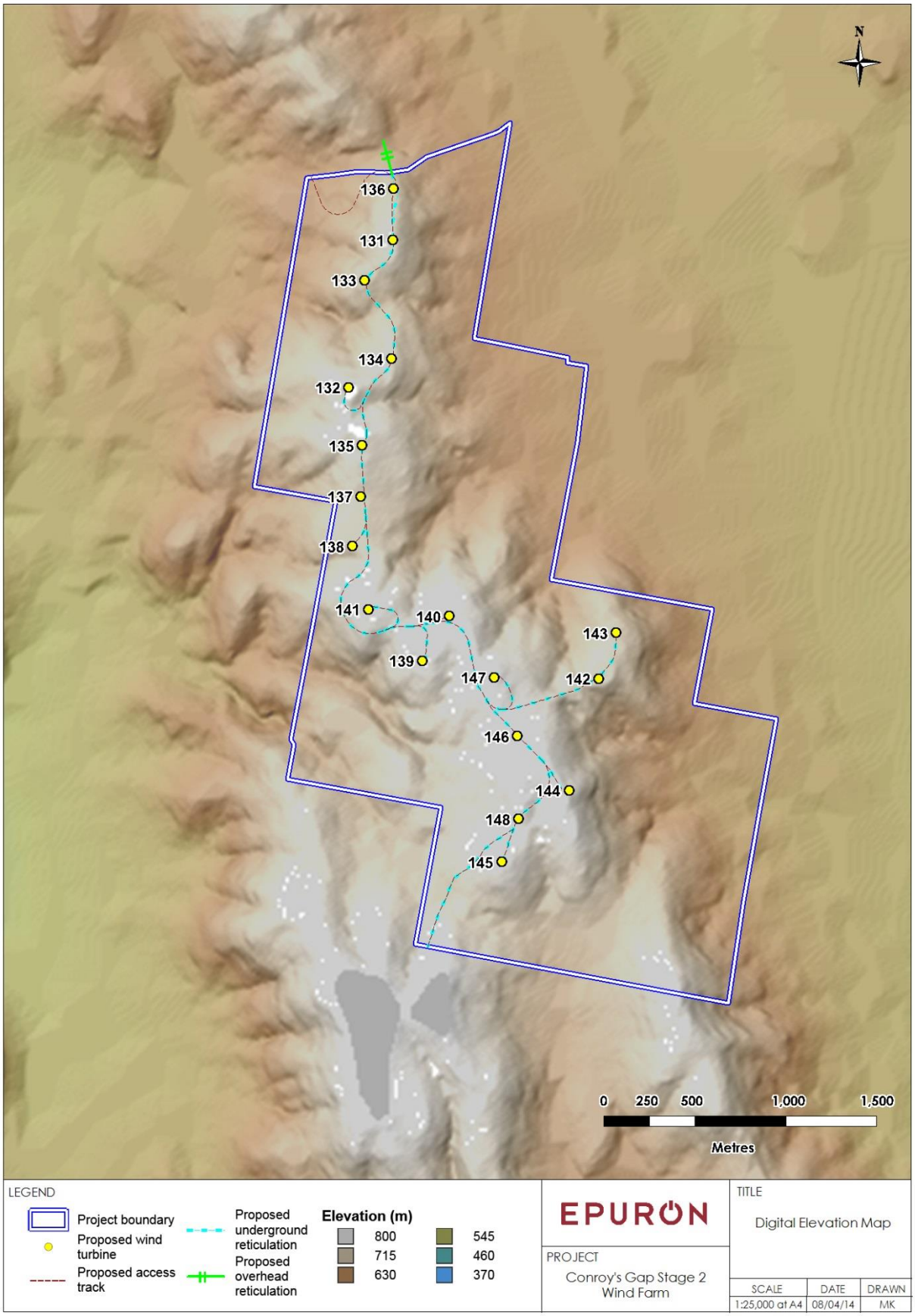

Figure 2-4 Digital elevation map

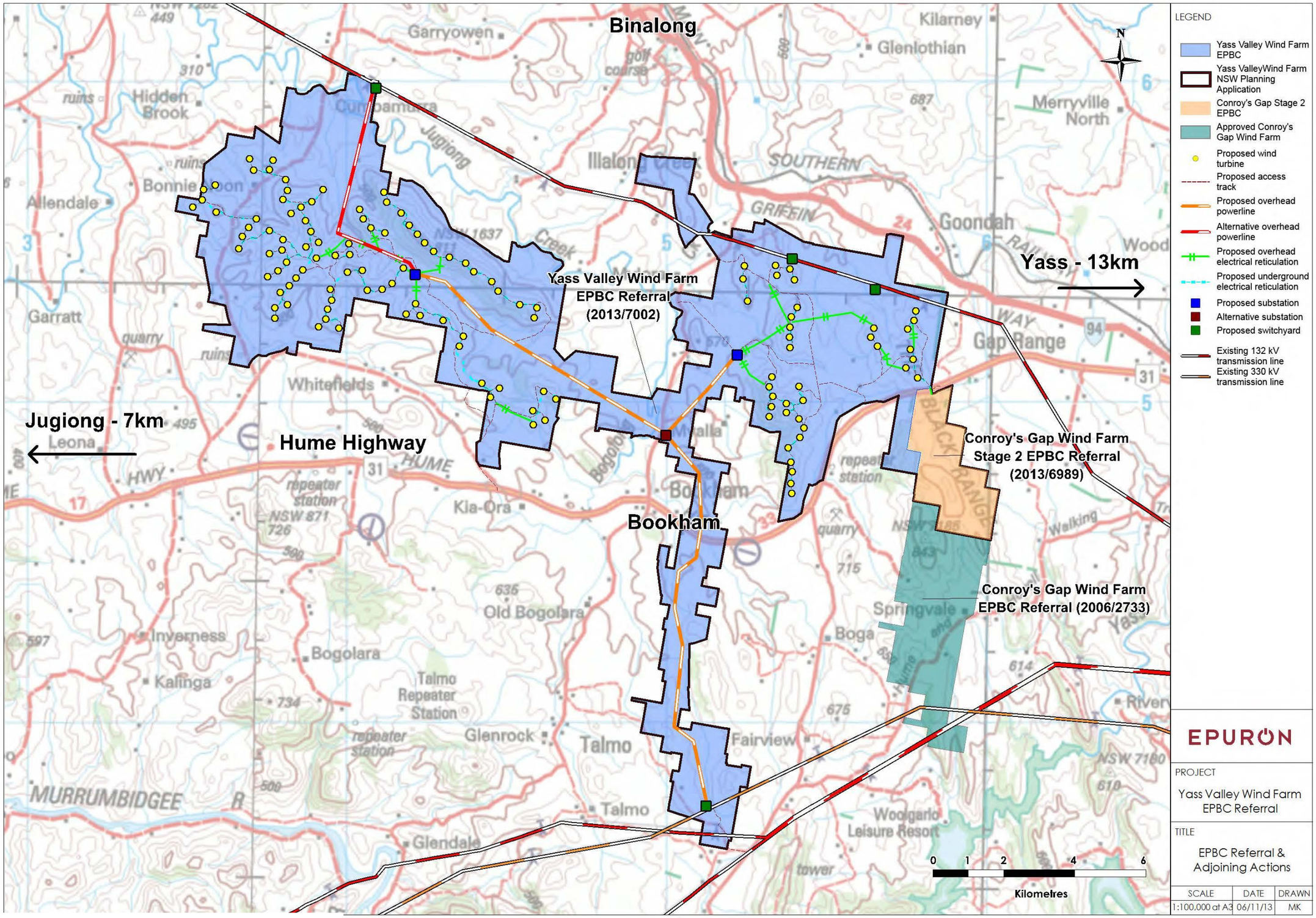

Figure 2-5 EPBC referral and adjoining actions

3 Description of the Environment & Matters of National Environmental Significance

3.1 Current Land Use(s) & Adjoining Properties

Yass Local Environment Plan 2013

Yass Valley Council was created by council amalgamation in 2004, and as a result three LEPs (Gunning, Yarrowlumla and Yass) applied in different parts of the local government area. The project is located on land which was subject to Yass LEP 1987, zoned No 1(a) Rural Agriculture. Wind farms were permissible with consent in Zone 1(a) Rural Agriculture.

Since the wind farm project entered the planning process Yass LEP 1987 has been replaced with Yass Valley Local Environmental Plan 2013. The project site is now zoned RU1 (Primary Production).

Wind farms would be prohibited in zone RU1 (Primary Production), however SEPP (Infrastructure) would override the prohibition (clauses 8,33 and 34), resulting in development for the purpose of electricity generating works, such as the proposed wind farm, being permissible with consent.

3.2 Description of Land Topography

The areas surrounding the proposed Conroys Gap Stage 2 Wind Farm are predominately cleared hilly farm land, with existing infrastructure including roads, rail, transmission lines, towers, power lines, and communication towers as well as the typical infrastructure and buildings associated with farming activities.

The proposed Conroys Gap Stage 2 Wind Farm is located on low hills and ridgelines on the southern side of the Hume Highway. The topography within the viewshed can be described as rolling hills, often creating enclosed visual corridors. Typically the hills and valleys have been cleared for farming activities however; much of the existing farmland also contains scattered remnant trees. The Conroys Gap Stage 2 Wind Farm is located on hilly areas where the elevation change across the site may vary from approximately 550-850 m.

3.3 Description of the Matters of National Environmental Significance

The Department of Environment (DoE) (formally SeWPAC) requested further information on a number of matters of environmental significance in order to be able to assess the relevant impacts of the action. These include:

- White Box-Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland)
- Golden Sun Moth *(Synemon plana)*
- Superb Parrot *(Polytelis swainsonii)*
- Regent Honeyeater *(Xanthomyza phrygia)*
- South-eastern Long-eared Bat *(Nyctphylis corbeni* (formally *N. timoriensis)*
- Yass Daisy *(Ammobium craspedioides)*
- Swift Parrot *(Lathamus discolor)*
- Tarengo Leek Orchid *(Prasophyllum petilum)*
- Striped Legless Lizard *(Delma impar)*
- Pink-tailed Worm Lizard *(Aprasia parapulchella)*

Table 3-1 lists these species and communities and provides a summary of habitat, known records within the locality, distribution (where known), the likely impact of the proposal on the threatened entity, and if the entity is considered to be 'affected' by the proposal. Species and communities considered to be affected by the proposal are discussed in more detail in Section 3.6. This includes one community and five threatened species:

- Box Gum Woodland
- Yass Daisy

- Golden Sun Moth
- Superb Parrot
- Swift Parrot
- Regent Honeyeater

The remaining species would not be affected by the proposal. As demonstrated by Table 3-1, these are species where habitat is absent or marginal in the project site or where any potential for impact is minor, such that the proposal would not affect the wider population.

For the location of the survey effort undertaken within the project site, refer to Appendix B. Threatened species have been mapped for the project site (Appendix C) and within 10 km of the project site (Appendix D).

Table 3-1 Details of habitat, known records and impact summary for threatened species and communities requiring further information

For affected species, more detailed survey effort description and impact assessment is provided in the following sections.

Matters of NES	EPBC Status	General Habitat Requirement	Known Records	Survey Method / Effort	Impact Summary	Affected (Yes / No)
Box Gum Woodland	CE	This is a grassy woodland community, with White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*), and Blakely's Red Gum (*E. blakelyi*). This community can contain additional tree species however, shrubs are generally sparse. The groundcover usually contains numerous grasses and forbs (DECC 2008b).	Recorded within the project boundary and known for the region.	Refer Table 3-3.	Clearing of this community will occur for installation of an access track and underground cable only, however the maximum impact on Box Gum Woodland CEEC is minor and only affects a small area of Derived Grassland, but no overstorey species. The total area affected includes 0.096 ha. This community is discussed further in the following sections.	Yes
Golden Sun Moth	CE	This species is distributed in an area of NSW between Queanbeyan, Gunning, Young and Tumut. NSW populations are found in the area between Queanbeyan, Gunning, Yass, Young and Tumut. The species is reported from 48 sites in NSW, with 32 sites occurring in the ACT (DSEWPaC 2013). Forty-eight Bionet records of the species are known for the Murrumbidgee Catchment region, with the heaviest concentrations north of Canberra towards Yass. It occurs in grassy Box-Gum Woodlands and natural temperate grasslands, typically in low, open habitat and dominated by several wallaby grass species. Also may be associated with spear-grasses (Austrostipa spp.) or Kangaroo Grass *(Themeda australis*). Grasslands dominated by wallaby grass are typically low and open with bare ground evident between the tussocks. This is thought to be an important microhabitat feature as it is typically these areas where the females are observed displaying to attract males. The Golden Sun Moth has shown a preference for natural temperate grasslands or secondary grasslands (derived from Box Gum grassy woodland) that are dominated by a low and open cover of native wallaby grasses (*Rytidosperma spp.,* formerly *Austrodanthonia spp*.) (OEH 2013). The Golden Sun Moth has also been recorded in degraded and weed infested patches of grasses dominated by Redleg grass (*Bothriochloa macra*), spear grasses (*Austrostipa spp*.), weeping grass (*Microlaena stipoides*) and the introduced Chilean needle grass (*Nassella neesiana*) (OEH 2013).	Golden Sun Moth populations were not known within or nearby the project site when the original assessments were undertaken. However, since the original biodiversity assessments, the species distribution has increased and it is has been recorded north, south and east of the project site. Targeted surveys undertaken in November/December 2013 revealed that this species is present at the northern end of Conroy's Gap Stage 2 precinct.	Targeted surveys were undertaken over a five day period at five sites across Conroys Gaps Stage 2 precinct (the broader Yass Valley site was also surveyed during this time). Refer to Appendix H for locations of survey areas. Refer Table 3-3.	Potential for impact on this species has now been noted and this species is discussed further in the following sections.	Yes
Superb Parrot	V	Found throughout eastern inland NSW. On the South-western slopes the core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west (DECC, 2008). It inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. Nesting habitat on SW Slopes is often open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Nests in tree hollows September-January in small colonies, often with more than one nest in a single tree. Blakely's Red Gum is the main source of nesting hollows (Davey 1997). Superb Parrot nest trees tend to be close to watercourses (Webster 1988). The species is faithful to traditional nest sites (Webster 1988). At the micro scale, distribution and abundance is influenced by tree cover and species composition. Nest trees tend to be older, often affected by dieback with little regeneration (Manning 2004). It forages on the ground in grassy woodland, also on fruit, seeds and blossoms of acacias, eucalypts and mistletoes (Pizzey et al. 2006). The species feeds in trees and understorey shrubs and on the ground. Food items are mainly flowers, fruits and seeds. Understorey food species include Common Wallaby-grass (*Austrodanthonia caespitosa*), numerous wattle species, and introduced plants including cereal grains, barley-grasses (DNRE 1992).	The Superb Parrot has been recorded within the locality (north of the Hume Highway) and was observed driving between field survey sites within mature woodland along Illalong Road, 8 km west of the project site; however, the species was not recorded within the vicinity of the proposed turbine sites.	Refer Table 3-3.	Potential foraging and breeding habitat is present within the development envelope. Potential for impact on this species was noted and this species is discussed further in the following sections.	Yes
Regent Honeyeater	E, Mi	Regent Honeyeaters mostly occur in dry Box-Ironbark eucalypt woodland and dry sclerophyll forest associations in areas of low to moderate relief, wherein they prefer moister, more fertile sites available, for example along creek flats, or in broad river valleys and foothills. In NSW, riparian forests containing River Oak (*Casuarina cunninghamiana*), and with Needle-leaf Mistletoe (*Amyema cambagei*), are also important for feeding and	The Regent Honeyeater was not identified at the site during surveys. Closest records of this species are approximately 14 km north-west of the	Refer Table 3-3.	No breeding habitat would be affected. Potential foraging habitat is present within the project site and it is considered possible that this species could occur there. Potential foraging eucalypt species that occur within the project site include Yellow Box, Blakely's Red Gum, Red Box and Red Stringybark within Box Gum Woodland. However, the Box Gum Woodland available is generally degraded and trees are largely scattered within their distribution	Yes.

Matters of NES	EPBC Status	General Habitat Requirement	Known Records	Survey Method / Effort	Impact Summary	Affected (Yes / No)
		breeding. A small number of breeding sites are known in NSW, the most important are: Warrumbungles NP, Pilliga NR, Barraba district, central coast around Gosford, Hunter Valley, and Capertee Valley, with the closest being Capertee Valley approximately 230km north of the site (NPWS, 1999). Wee Jasper Nature Reserve is a 700 hectare reserve located around 30km south of the study area, where the Regent Honeyeater has also been recorded. It is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Yellow Gum, Blakely's Red Gum and White Box (Menkhorst et al., 1999). The species can undertake large-scale nomadic movements in the order of hundreds of kilometres.	site nearby Binalong.		within the project site. The proposal only affects a minor area of moderate condition Box Gum Woodland (0.558 ha) that is not considered optimal habitat for this species. Habitat quality is marginal and the species is therefore unlikely to be a permanent resident of the project site. Little information is available on the migration patterns of this highly mobile species; however regional records across NSW indicate a strong presence of this species to the south, east and north-east of the project site in better quality habitat (i.e. National Parks). This better quality habitat includes Namadgi NP, Morton NP, Nattai NP and Blue Mountains NP. It is expected the movement of this species would commonly occur through this connection where better quality foraging resources exist. Although impacts to potential habitat from the proposal are considered minor, this species is discussed further in the following sections due to collision risk impacts.	
South-eastern Long Eared Bat	V	The South-eastern Long Eared bat inhabits a variety of vegetation types including Mallee, Bulloke (*Allocasuarina leuhmanni*) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. It can be found in the Hunter Valley, extending from central NSW to the eastern Hunter Valley coast. Records also indicate populations in River Red Gum, (*Eucayptus camaldulensis)*, forests along the Murray River (Law & Anderson 1999). In Queensland, the South-eastern Long-eared Bat is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas. Its westerly range extends into the Mulgalands Bioregion and west of Bollon. There are limited records in Victoria, with patchy distributions in the Northern Plains and Mallee regions (Koehler 2006; Lumsden 1994). It will roost in tree hollows, crevices, and under loose bark. This species is a slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. Foraging activities are concentrated around patches of trees in the landscape. Individuals appear to have defined foraging areas which they return to; they do not defend foraging areas and many individual from different species may share the same area. Mating takes place in autumn with one or two young born in late spring to early summer. Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. In a recent roosting study individuals were found to move large distances on a nightly basis. Roost sites were on average 1.89 ± 1.61 km (range 0.34–7.06 km) from the capture point. Individuals used a number of different roost sites within the time they were tracked. Most roosts were used for just a single day (1.3 ± 0.6 days) before the individual moved to a new roost site. In contrast to other species of long-eared bats which move regularly between a number of roosts that are close together (e.g. within 300 m; Lumsden & Bennett 2006), South-eastern Long-eared Bats moved large distances 1.91 ± 1.86 km (range 25 m–5.88 km) between consecutive roosts.	The South-eastern Long-eared Bat was not identified on site during surveys. This species has not been recorded in the region and the closest records are located near Tumut more than 75 km south-west of the site. Other records for this species are located near Canowindra, about 125kms north of the subject site in 2006.	Two sites within the Conroy's Gap Stage 2 precinct were surveyed. Microbat echolocation call Anabat detectors were placed at potential habitat areas for this species. Anabats were recorded for approximately 12 hours each night. **Marilba Precinct** Anabats were placed within lowland Box Gum woodland remnants and near the proposed substation. **2007:** 26-28 March	This species has not been recorded within the subject site and the closet record is over 70kms away. Studies have shown that this species is known to roost up to 7kms away, which suggests current records of this species would not roost or travel in close proximity to the subject site. The action is not likely to result in significant impacts on the species such that the action leads to a long-term decrease in the size of a local population. An adaptive Bird and Bat Monitoring program would be developed prior to construction and would include the collection of baseline (pre-operational) as well as operational monitoring data. This program would be implemented in consultation with Office of Environment and Heritage (OEH) and Department of Environment (DoE). Wind is a significant and growing alternative energy source for Australia and other countries, with areas in southern Australia identified as suitable sites for wind farms. Wind farms around the world are however known to affect some birds and bats by striking wind turbine blades or possibly from barotrauma (rapid changes in air pressures associated with the moving blades). Barotrauma largely affects bat species rather than birds. A bats lungs are balloon like, with two-way airflow ending in thin flexible sacs surrounded by capillaries. When the outside pressure drops, those sacs can over-expand, bursting the capillaries around them, resulting in barotrauma. Bird lungs are more rigid and tube-like, with one-way circular airflow passing over and around capillaries. That rigid system can more easily withstand sudden drops in air pressure. Birds can fly through the pressure differentials and because of their skeletal features and anatomy; they are better able to withstand that pressure gradient. Most bird species that are found dead near turbines are a result of blunt force trauma and not barotrauma. A commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required.	No. This species has not been recorded within the subject site. The nearest records are over 70 km away.
Yass Daisy	V	Yass Daisy occurs in dry forest, box gum woodland and secondary grassland derived from clearing of these communities. It grows in association with a large range of eucalypts including Blakely's Red Gum (*Eucalyptus blakelyi*),	The Yass Daisy was identified at the proposed site during	Refer Table 3-3.	The locations of the known Yass Daisy records for Conroys Gap Wind Farm Stage 2 are located in the south of the project area nearby a proposed underground cable and access track (refer to Appendix F). An EPBC	Yes

Matters of NES	EPBC Status	General Habitat Requirement	Known Records	Survey Method / Effort	Impact Summary	Affected (Yes / No)
		Apple Box (*E. bridgesiana*), Broad-leaved Peppermint (E. dives), Long-leaved Box (*E. goniocalyx*), Red Stringybark (*E. macrorhyncha*), Brittle Gum (*E. mannifera*), Yellow Box *(E. melliodora*), Red Box (*E. polyanthemos*) and Candlebark (*E. rubida*). The species tolerates light grazing. Populations persist in some grazed sites.	targeted field surveys in 2009. This species has been recorded within the project boundary and is known for the region. Within the locality this species appears widespread and the population size is likely to be in the hundreds, potentially thousands at the site (nghenvironmental 2009a, 2009b). This species was recorded regularly for the Yass Valley Wind Farm. Numerous NSW Wildlife Atlas records in district including along Black Range Road, Burrinjuck Road and Hume Highway. Refer to Appendix F for a map of Yass Daisies recorded during field surveys.		Assessment of Significant (AoS) impact was carried out for this species in the original biodiversity assessments. Measures were developed to protect this species from significant impact, largely the undertaking of additional surveys, mapping and avoidance of known populations. The latter has now been accomplished, and was documented within the SER (nghenvironmental 2012). As a result the proposal will not impact any known populations of this species. Potential for impact on this species was noted and this species is discussed further in the following sections.	
Swift Parrot	E, Ma	Breeds in Tasmania, migrating to south and eastern NSW in autumn/winter where it inhabits eucalypt forests and woodlands, particularly Box-Ironbark Forests of central Victoria and southern NSW (Smales, 2005; DECC, 2008). Mostly occurs on the south-west slopes. It feeds on nectar flowers of eucalypts and lerp-insects, also soft fruits and berries sometimes foraging in grass (Pizzey et al 2006). Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box (DECC, 2008).	This species has been recorded near McMahons Reef 15 km north- west of the project site in 1997. The Swift Parrot was not identified during any survey events for the Yass Valley Wind farm site.	Refer Table 3-3.	Potential foraging habitat for this species is present at the proposed site and it is possible that this species occurs there during its winter migration. Potential for impact on this species was noted and this species is discussed further in the following sections.	Yes
Tarengo Leek Orchid	E	Recorded from grassy woodland in Hall cemetery, c. 50km south-east of the site, Booroowa 50km north of the site and Captains Flat, in Natural Temperate Grassland, Box-Gum Woodland or moist grassy flats, with kangaroo grass or wallaby grasses (*Austrodanthonia* spp), in silty clay-loam. The Hall and Captains Flat populations occur in areas with high water tables. Flowers Oct-Nov.	Not known within the 10 km locality of the project boundary.	Flora surveys were undertaken in March 2007, following a dry summer and extended drought period. (Referred to as Cluster 7 in Marilba Biodiversity Assessment Report). An inspection was also undertaken again in spring 2008 to supplement records with spring-flowering species. Three quadrat surveys and three random meander surveys were undertaken across Conroy's Gap Stage 2 precinct.	No potential for impact. Natural populations of this species are known from only four sites in NSW. These include Boorowa, Captains Flat, Ilford and Delegate. The orchid is known only from ungrazed remnants of high native species diversity. At the Tarengo TSR, the Tarengo Leek Orchid grows in remnant *Themeda triandra-Bothriochloa macra* grassland (NPWS 2002). All known populations of Tarengo leek orchid occur on Crown land. No populations are yet known from private land. This species is highly susceptible to grazing, only being retained at areas where grazing is in low numbers such as cemeteries. The subject site has been subject to extensive grazing regimes over the years, hindering potential habitat for this species to occur. Potential habitat at the subject site was surveyed during the November flowering period (spring 2008) for this species (it was flowering at Hall Cemetery during the survey period) and was not recorded. The potential for its presence elsewhere at the subject site is very low.	No. Due to this species not being detected during field surveys and little potential habitat occurring within the subject site, it is considered that this species would not be affected as a result of the proposed wind farm site. Therefore it has not been discussed further.
Striped Legless Lizard	V	Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. It inhabits temperate lowland grasslands, secondary grasslands and occasionally in open Box-Gum Woodland. It has been	Not known within the 10 km locality of the project boundary.	Surveys for these species were undertaken as part of a boarder search area for the nearby Yass Wind Farm project which included	Potential habitat (i.e. rock outcrops) is present, but sporadic within the site and heavily grazed. It is considered possible, but unlikely, that this species occurs at the site. The majority of the project site has either no surface rock or	No. Due to these two species not being detected during field

Matters of NES	EPBC Status	General Habitat Requirement	Known Records	Survey Method / Effort	Impact Summary	Affected (Yes / No)
		recorded at sites dominated by introduced species (such as *Phalaris aquatica, Nasella trichotoma* and *Hypocharis radicata*) and sites with a history of grazing and pasture improvement (Smith and Robertson, 1999). Shelters in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and ground debris such as timber. The key to their survival in rural areas may be the availability of shelter during disturbance events (Smith and Robertson, 1999).	This species has been recorded in the region near Yass and south of Gundagai	Conroy's Gap Stage 2 Wind Farm project area at the time of surveying. Representative reptile habitat was surveyed. Searches focused on ridge and slopes with extensive rock outcropping, however woodland, leaf litter, hollow logs, tussocks, and sheets of metal were also searched.	outcropping bedrock. Some limited areas have surface rock and potential habitat with largely exotic forb vegetation cover, but are dominated by large weeds such as Scotch Thistle and European Nettle which provides dense ground level shading and are unlikely to provide suitable habitat for these species. Neither species were detected during extensive targeted searches (rock-rolling) in potential habitat during the survey. An EPBC AoS was undertaken for the Pink-tailed Worm-lizard and Striped Legless Lizard concluding that, given the discrete nature of the development, the marginal habitat on-site and the grazing regime within these areas, and the extent of similar nearby habitat, habitat removal is considered to be a low risk for these species. The action is not likely to result in significant impacts on the species such that the action leads to a long-term decrease in the size of a local population. Management measures to be included in the Construction Environmental Management Plan (CEMP) would be implemented prior to construction to retain the limited areas of potential habitat resources at the site for these two species. These include: Clusters of rocks and boulders should be avoided where possible. Where rocks and boulders cannot be avoided, they should be placed directly adjacent to the works area to preserve the availability of refuge. Where rocks are to be removed, pre-clearance for threatened reptiles should be undertaken by experienced personnel. Standing dead trees, stumps and woody debris should be avoided where possible. Where they require removal to allow for the tracks and hardstand areas, they should be placed adjacent to the impact areas, to retain these refuges in the immediate area. A Biodiversity Management Plan would be prepared within the CEMP to document the implementation of biodiversity measures, sourcing the Biodiversity Assessments prepared for each precinct for area specific measures. This would include construction and operational activities. The plan would include specific additional survey work which would be used to microsite infrastructure, where practical, and offset impacts, where they cannot be avoided. The target features / species include: …Striped Legless Lizard.	surveys and little potential habitat being available within the subject site, it is considered that these species would not be affected as a result of the proposed wind farm site. Therefore they have not been discussed further. Precautionary measures are included in the mitigation measures for the proposal to address uncertainty and retain potential habitat where possible.
Pink-tailed Worm-lizard	V	Known only from the Central and Southern Tablelands, and the South Western Slopes (Osborne and Jones, 1995). There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. This species inhabits sloping, open woodland areas with predominantly native grass ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Typically these areas are well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks in burrows below these rocks; the burrows usually have been constructed by and are often still inhabited by small black ants and termites (Osborne and Jones, 1995). This species feeds on the larvae and eggs of these ants (DECC 2008a).	Not known within the 10 km locality of the project boundary. The closest record is from Boorowa (2001), approximately 35km north of the site.	Rock-rolling was the primary search method as habitat assessments revealed marginal habitat and access limitations (steep slopes and no vehicle access) which prevented placement of artificial shelters. However all searches were undertaken in areas of potential habitat in known periods of activity (spring and early summer when temperatures were below 25 degrees) and in search areas a search beneath all rocks that could be turned was undertaken. The soil was also raked with a hand rake. **2007:** 26-28 March. 3 surveys of 30 minutes duration (3 person hrs) **2008:** 16-22 September. 14 surveys of 20-80 minutes (7.75 person hrs) **Total Effort**: 10.75 person hrs.		

KEY: CE – Critically Endangered, **E** – Endangered, **V** – Vulnerable, **Mi** – Migratory, **Ma** – Marine.

NOTE: Information on habitat and populations has been sourced from the Species Profile and Threats Database (SEWPaC 2012). Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

3.4 Discussion of survey methodologies

Best practice guidelines were referenced for the Conroy's Gap Stage 2 wind farm site surveys. Surveys undertaken at Conroy's Gaps Stage 2 formed part of "Cluster 7" under the Marilba Wind farm precinct Biodiversity Assessment. These include:

1. Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Published 2010.
2. Survey Guidelines for Australia's Threatened Reptiles: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Published 2011
3. Survey Guidelines for Australia's Threatened Bats: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Published 2010.

Each guideline specifies survey timing, effort and methods to be implemented for certain threatened species. The table below summaries the best practice survey guidelines for the affected species.

Table 3-2: Summary of survey guidelines for listed species

Species	*Recommended Survey Timing*	*Recommended Survey Technique*	*Recommended Survey Effort*
Birds			
Superb Parrot	Active and conspicuous, though quiet in the heat of the day. Can be difficult to detect when quietly feeding in canopy. Voice distinctive; contact call usually uttered in flight (Higgins 1999). Make regular seasonal movements from breeding areas, though the relationship between breeding and non-breeding ranges is speculative. No strong evidence to differentiate dispersal from migration (Higgins 1999).	**Area Searches** (in areas <50ha) Area searches or transect surveys of suitable habitat, preferably in the early morning (sunrise to 10 am) and evening (4 pm to sunset). Morning surveys may be of greater value as the species' movements is more coordinated at this time. Detection by sighting or call, usually of flying birds. Vehicle-based transects appropriate in areas where most habitat is restricted to roadside remnants. Survey effort will need to be increased outside the breeding season, as dispersal makes the species more difficult to detect. **Targeted Searches** As above	**Area Searches** 12 hours over 4 days **Targeted Searches** 12 hours over 4 days
Regent Honeyeater	Can be conspicuous in the breeding season and when larger groups form at good nectar sources. At other times are often inconspicuous, calling quietly and being difficult to locate in the crowns of trees (Higgins et al.2001; D. Geering pers. comm.). Detection usually by call, although calls appear to differ between birds in south and north of range (D. Geering pers. comm.). May mimic calls of other birds (Higgins et al. 2001). Respond to playback calls immediately before and during the breeding season (Geering 1997).	**Area Searches** (in areas <50ha) Area searches in suitable habitat, preferably in the morning but other times may also be appropriate. Detection by call is possible when birds are most vocal (outside the breeding season). Otherwise, detection is by sighting. **Targeted Searches** Targeted searches of woodland patches with heavily flowering trees is useful, especially around water points such as dams and creek lines. Also check among flocks of other blossom nomads such as lorikeets and other honeyeaters. Broadcast surveys immediately before and during the breeding season may also be useful.	**Area Searches** 20 hours over 10 days **Targeted Searches** 20 hours over 5 days
Swift Parrot	Timing: surveys on the mainland should be conducted between March and July. Often noisy, active and conspicuous but can feed silently and become quite cryptic especially in the middle of the day (Kennedy & Tzaros in press). Typically allows close approach when feeding in trees. Often associates with lorikeets and honeyeaters at abundant food sources (Higgins 1999).	**Area Searches** (in areas <50ha) Area searches or transect surveys of suitable habitat, preferably in the early morning and afternoon when birds are most active and vocal. Detection by sighting or call. Slow-moving vehicle transects also effective in expansive areas, detecting loud, distinctive 'clinking' call that can be heard over noise of engine. **Targeted Searches** Targeted surveys of patches of heavily flowering eucalypts may be useful.	**Area Searches** 20 hours over 8 days **Targeted Searches** 20 hours over 8 days

Species	*Recommended Survey Timing*	*Recommended Survey Technique*	*Recommended Survey Effort*
Bats			
South-eastern Long eared bat	Survey best conducted on warm nights from October through to April.	**Harp Traps/Mist Nets** Mistnets and harp traps should be placed in woodland, mallee and forest, given that the species forages below the tree canopy, often to ground level. Equipment should be placed both in open fly-ways and within cluttered vegetation. If open water bodies (earth dams, fire dams, open top tanks and watercourses) occur in or near the project area, then significant effort should be given to mist-netting or harp trapping over the water. For project sites where there is no surface water, mistnets can be set over temporary water pools specifically constructed for the purpose of the survey. **Acoustic Detection** Bat detectors can be used to identify areas used by long-eared bats, even if they cannot be identified to species level. Acoustic detection can then be followed up with an appropriate level of trapping.	**Harp Traps/Mist Nets** 20 trap nights recommended with a minimum of five nights.
Invertebrates			
Golden Sun Moth	Throughout the cooler parts of the Golden Sun Moth's range, the flying season can vary between early November to mid-December and late November to early January. In warmer areas, such as the Wimmera area in western Victoria, adults may first appear in late October and fly until late November (Douglas 2004). In years with a cold, wet spring, adult moths may not start flying until early December and continue through until mid to late January (DEC 2007). Because of the variability in the timing of the flying season, a known occupied reference site near the study site should be monitored to indicate the start and duration of the local flying season.	Both fixed point (or "spot count") and transect surveys may be useful for detecting Golden Sun Moth. **Fixed point method** Best suited to very small sites or sites which harbour a small population (DEC 2007). Observer chooses a reference point typically on the edge of the site (or area of activity) from which the whole site can be observed. Using a hand counter and stopwatch the observer records the number of moths seen in a given time period taking care not to record the same individual twice. If the whole area cannot be surveyed from a single position the observer may alternate positions between successive counts (DEC 2007). **Transect method** Most commonly used method for monitoring butterfly populations (Pollard 1997 cited in DEC 2007). Particularly suited to large sites with extensive populations (DEC 2007). Observer walks a number of transects recording all	At least four suitable days during the flying season of the species. Recommended that detection surveys be staggered at least a week apart to increase the likelihood that at least some members of the population are observed (Gibson & New 2007). **Fixed point method** Typically three to six minutes. Repeat point count as many times as

Species	*Recommended Survey Timing*	*Recommended Survey Technique*	*Recommended Survey Effort*
		individuals seen using a hand counter and a recording device (e.g. a portable electronic note taker). Transects are typically marked along the long axis of the site, and should be between 5 and 100 m apart, depending on the size and topography of the site. At very large sites 200 m intervals may be needed in order to cover the whole site in a reasonable time (i.e. while moths are active). Surveys conducted using the fixed point or transect method can also be used to estimate the relative abundance of the species on a site, although this may require an increase in search effort (see Gibson & New 2007).	necessary (e.g. three to five) with a five minute interval between counts. **Transect method** Observer walks for 100 m, recording the number of moths seen per 100 m, taking care not the count the same individual twice. On large sites multiple observers may be required starting at opposite sides of the site. Two observers walking transects 200 m apart would require about two hours to survey a 100 ha site (Clarke & Dunford 1999).
Reptiles			
Pink-tailed Worm Lizard	Search success appears to be highest in spring and early summer on warm but not hot days, after a period of rainfall extending over several days. This species can be found throughout the year by searching under rocks, however, it appears to be more difficult to detect during hot dry periods (Osborne et al. 1991). Peak activity is likely to be late spring and early summer under warm, but not overly dry, conditions. It is not active on the ground surface by day and would only be active between sheltering sites at night.	The following survey methodology was adopted by Osborne and colleagues (1991): Searches restricted to an area of relatively homogeneous habitat within each site and a search beneath all rocks that can be turned is made. During summer months surveys are carried out in the mornings or on cloudy days when soil temperatures beneath the rocks are not too high. During late autumn and winter surveys are carried out on clear sunny days as warming of the rocks appears to attract individuals to the soil surface beneath the rocks.	Rock cover density rather than fixed area size determines a plot, and 150–200 rocks need to be turned to be reasonably confident of determining the species' presence.
Striped Legless Lizard	Surveys for the striped legless lizard are primarily undertaken during the active period of the species (between September and May). Some survey techniques (such as	The striped legless lizard is a cryptic species and may not be detected by surveys even when present at a site. Reference sites may need to be monitored during the expected active period of the species and used to	**Rock Rolling** Dorrough and colleagues

Species	Recommended Survey Timing	Recommended Survey Technique	Recommended Survey Effort
	active searching) may be undertaken during the cooler months of the year, but often with less success. This species shows strong seasonal activity, with most pitfall trap records coming from the period October to November (Osborne et al. 1993). They have also been collected from under basalt rocks in the Cooma area during the same time (Dorrough et al. 1996). Other individuals collected opportunistically by hand have been found during cooler months (April to August) when they have apparently been hibernating (Coulson 1990; Husband 1995). This interpretation accords with the observations on captive animals in outdoor enclosures in the Melbourne area (Banks et al. 1999), which were rarely observed during the period May to September.	guide survey timing at the target site(s). **Rock Rolling** In areas with surface rock, artificial shelter site surveys or rock turning should be the primary technique (with supplementary techniques employed as appropriate). However, rock turning can be detrimental to striped legless lizard populations, especially when undertaken regularly. Therefore, this method should be used only when other methods are unavailable and it should never be employed for long-term monitoring. Active searching (checks under surface rock and debris and around tussocks) can generally be undertaken throughout the year as long as any limitations with respect to this survey technique are clearly outlined. This technique has a low success rate and usually leads to disturbance of refuge sites. It should only be used where necessary. **Artificial Shelters / Pitfalls** In areas with little to no rocky habitat (such as the ACT), artificial shelter site surveys or pitfall trapping should be used in conjunction with hand searches around tussocks. Detection rates using artificial shelter sites are nearly double that of pitfalling when undertaken during spring. Artificial shelter sites should be installed at least three months prior to the initial survey/checks (that is, by June). They should typically be placed in vegetated areas (not bare ground). Pitfall trapping is typically conducted in vegetated areas (not bare ground), and is undertaken in warmer months (September to January).	(1996) reported a success rate for locating the species of approximately one individual per 150 rocks. **Artificial Shelters** In Victoria, the Department of Sustainability and Environment recommends at least six months of survey. **Pitfalls** Each pitfall should have a minimum drift line of 5 metres. Various pitfall configurations can be used, but should include up to five pits per configuration. As a minimum, two pitfall configurations should be used for sites less than 25 hectares in size, with a minimum of 10 pitfall traps. At least 50 pitfall configurations should be used for sites greater than 25 hectares. Daily checks should be conducted for at least 10 days, though a longer survey period (28 days) is preferable to detect populations at low abundance.

3.5 Species / communities affected by the proposal

One EPBC listed community and five EPBC listed threatened species were deemed to have potential to be 'affected' by the construction and/or operation of the Conroy's Gap Stage 2 Wind Farm (refer to Table 3-1). These include:

- Box Gum Woodland
- Golden Sun Moth
- Superb Parrot
- Regent Honeyeater
- Yass Daisy
- Swift Parrot

3.6 Assessment of affected species

Table 3-3 details the survey effort (location, methods and timing) undertaken for each affected species, the location and extent of known populations or individuals within the project site and locality, and the habitat to be affected by the proposal. The type of impact relevant to each species is identified in Table 3-3; however further discussion is presented in Section 4.

Table 3-3 Details of survey effort, distribution and habitat of affected species

Survey Effort (refer Appendix B)			Distribution (refer Appendix C)			Habitat			Type of Impact	Distance of species to proposed works (within 500m)
Species	**Effort and Methods[1]**	**Timing**	**Location and extent of species in project site**	**Number of Individuals located**	**Known populations within 10 km radius (see Figure)**	**Habitat within site (detail ha)**	**Extent of habitat impacted and quality (ha)**	**Habitat within region (general)**		
Box Gum Woodland CEEC	A three tiered approach incorporating plot-based, traverse and general inspection methods was used to ensure that vegetation could be characterised in detail. *Quadrats*: three 20m x 20m areas were used to survey vegetation structure and floristics. *Random meanders*: three transects up to 30 minutes in duration and covering about one hectare were undertaken. Floristics and structural and physical data were recorded. *Inspections*: three dedicated searches in specific habitat areas were undertaken. Refer to Appendix B – Survey effort for map of survey efforts.	**Cluster 7 (as part of Marilba BA)** **2007:** March.	**Cluster 7 (as part of Marilba BA):** Located in the south-west of the project boundary, west of most southern turbine site. About 20.86 hectares of Box Gum CEEC is present within the Conroy's Gap Stage 2 precinct area. *Note: Location of Box Gum CEEC is provided in Appendix E.*	N/A	N/A	Box Gum Woodland generally located on ridge crests, saddles, gentler slopes and valleys, on volcanic and sediments, all elevations. Vegetation communities and condition classes are quantified and mapped in BAs. **Referred to as Cluster 7 Area in Marilba BA:** 20.86 hectares of good BGW CEEC in assessment area. Located about 250m to the west of most southern turbine site.	The total area affected includes 0.096 ha. The extent of this CEEC corresponds to vegetation recorded as Box Gum Woodland (BGW) in moderate to good and good condition. Clearing of this community will occur for installation of an access track and underground cable only, however the maximum impact on Box Gum Woodland CEEC is minor and only affects a small area of Derived Grassland, but no overstorey species. The proposal has been modified to ensure that CEEC areas would not be significantly impacted and impact is mostly attributed to impacts associated with the overhead powerline.	The extent of CEEC quality vegetation in the region not known. However, the community is more likely to remain within public land reserves, roadsides, or on lightly grazed or grazing restricted properties.	Clearing of CEEC	As well as direct clearing impacts, indirect impacts may result as CEEC occurs within 10 metres of infrastructure at some sites.
Golden Sun Moth	Golden Sun moth surveys were undertaken over a five day period (20, 25, 26 November and 2 and 3 December 2013) across the Yass Valley Wind Farm area and Conroys Gap site. Five survey locations were undertaken at the Conroy's Gap Stage 2 precinct on the 20 November 2013. 13 turbine sites were not visited due to time constraints and restricted access. All sites were surveyed using a random meander method or point count method in accordance with prescribed survey techniques outlined in Survey Guidelines for Golden Sun Moth (Conservation Planning and Research, ACT Government, November 2010). The exception is that multiple site visits were not undertaken during this survey period.		The Golden Sun Moth was recorded at one location within the Conroy's Gap Stage 2 precinct site. It was recorded between the two most northern turbine sites (turbine number 136 and 131). Four individual males were recorded. The highest densities were recorded 5kms to the west on the Marilba site (Yass Valley Wind Farm) near the existing 132kV transmission line at waypoint 652498E, 6155096N on the 26 November at 11.40am with over 100 individual males observed within a 7-8ha paddock.	4 males.	Species also recorded at the Yass Valley Wind Farm proposal site, to the immediate north of Conroys (Refer to Appendix H mapping and survey report). The species is now also known from the localities of Bango and Rye Park, in the region.	The species is generally known from grassland/woodland mosaics. As understorey varies and intergrades between exotic-dominated and native-dominated species composition, mapping potential habitat with accuracy is very difficult. Given the broad habitat preference of this species, potential habitat was estimated as all Box Gum Woodland Derived Native Grassland in any condition (poor to good). This equals approximately 291 ha within these vegetation types across the Conroys Gap project area. This estimate of potential habitat was based on vegetation type rather than surveys, given that not all of the infrastructure sites were able to be surveyed (100 out of 144 turbine sites and existing tracks enroute to these areas were surveyed, including the Yass Valley Wind Farm site; for the Conroys site alone, 5 survey locations, covering approximately 60% of the ridgeline length was	Box Gum Woodland, Derived Native Grasslands, and native pasture. Moths were observed along a mid-slope to hill top area with *Rytidosperma spp. Austrostipa spp.,* and *Avena sp*. dominating the area. Observations were recorded where no infrastructure is proposed. Recorded in area between two turbine locations. TOTAL: Given this species is recorded in a variety of vegetation types of varying quality, the proposal would impact on 10.74 ha of potential habitat for this species. The species was found in one location at Conroy's Gap. It was	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Yass, Young and Tumut. The species is reported from 48 sites in NSW, with 32 sites occurring in the ACT (DSEWPaC 2013). Forty-eight Bionet records of the species are known for the Murrumbidgee Catchment region, with the heaviest concentrations north of Canberra towards Yass. The species distribution has increased and it is has been recorded on several occasions within the locality	Minor loss of habitat due to the pattern on infrastructure location (linear, discrete turbine footings). There is potential to minimise impacts further via preclearance surveys and the implementation of a management plan to microsite infrastructure where possible and offset impact.	Four individuals recorded between two turbine sites.

Survey Effort (refer Appendix B)			Distribution (refer Appendix C)			Habitat			Type of Impact	Distance of species to proposed works (within 500m)
Species	*Effort and Methods*[1]	*Timing*	*Location and extent of species in project site*	*Number of Individuals located*	*Known populations within 10 km radius (see Figure)*	*Habitat within site (detail ha)*	*Extent of habitat impacted and quality (ha)*	*Habitat within region (general)*		
						surveyed). As an alternate means to calculate habitat for this species within the site, an additional map has been provided, Appendix I, which extrapolates from the site information we have to estimate potential habitat. It is based on the location of each GSM search point and the assessment of habitat provided in the survey data. We have extrapolated 100m radius from each search point, this seeming a reasonable distance given the variation in understorey condition. We have also shown the results of the broader proposed Yass Valley Wind Farm site, for context. This provides the following estimates: • Low potential habitat: no records, not suitable, very poor to poor potential habitat (3.14 ha) • Moderate habitat: no records, poor – moderate potential habitat (9.42 ha) • High potential habitat: confirmed habitat (3.14 ha) Note: The result so far is conservative in that survey data show that the GSM was not found in all areas of potential habitat. Additional survey and impact area calculation is required to address gaps in survey (where infrastructure is proposed but surveys were not undertaken) and to provide an accurate area of impact on the final infrastructure layout to ensure appropriate offsets are provided, if required.	not recorded at four of the five sites that provide suitable habitat. The removal of 10.74 ha is a precautionary approach as surveys were only conducted over one day. Other surveys in the region have revealed that this species has increased in numbers and distribution and there is now a strong population with the Yass Valley region.	since the original biodiversity assessments for the Yass Valley wind farm area in 2009.		
Superb Parrot	**Undertaken as part of Marilba BA (cluster 7):** Bird censuses were undertaken within representative areas of all vegetation, habitat and landform types. Bird census of 30 person minutes duration: 7	**2007:** 26-28 March.	The Superb Parrot has been recorded within the locality (north of the Hume Highway) and was observed driving between field survey sites within mature woodland along Illalong Road, 8 km west of the project site; however, the species was not recorded within the vicinity of the proposed turbine sites.	None.	Records primarily north of the project site near Binalong or east of project site. Regional records of the Superb Parrot are concentrated to the west and north of the project site, but are less frequent	Remnant and regrowth Box-Gum Woodland and dry grass forest patches with a relatively continuous over storey cover. Approximately 20.86 ha of good quality Box Gum CEEC present within project site.	Suitable foraging, nesting and breeding habitat for this species is largely absent within the project site; the moderate condition Box Gum Woodland and Derived Grassland may provide some marginal foraging	The extent of habitat within the region is unknown; however, at a minimum habitat would be linked to the distribution of Box Gum Woodland and native grasslands (refer to Box Gum Woodland above).	Loss of foraging habitat, minor loss of potential breeding habitat Collision risks from migration events or local movements are low given, a) the species migration route appears to	N/A.

Survey Effort (refer Appendix B)			Distribution (refer Appendix C)			Habitat			Type of Impact	Distance of species to proposed works (within 500m)
Species	*Effort and Methods*[1]	*Timing*	*Location and extent of species in project site*	*Number of Individuals located*	*Known populations within 10 km radius (see Figure)*	*Habitat within site (detail ha)*	*Extent of habitat impacted and quality (ha)*	*Habitat within region (general)*		
	surveys **Total Effort:** 3.5 person hrs				nearby the project site. The records suggest the parrot relies on movement to the west of the project site confirming the assumption of Webster 1988 that the breeding population move west from the inland slopes.		habitat as the species feeds in trees and understorey shrubs and on the ground. The proposal would result in removal of 0.65 ha of this habitat.		primarily be west of the project site (as shown by regional records), and b) the species is unlikely to move across degraded ridge-tops and would use remnant patches along roadsides as 'stepping stones' during migratory or foraging movements.	
Regent Honeyeater	**Undertaken as part of Marilba BA (cluster 7):** Bird censuses were undertaken within representative areas of all vegetation, habitat and landform types. Bird census of 30 person minutes duration: 7 surveys **Total Effort:** 3.5 person hrs	**2007:** 26-28 March.	Not recorded in project site.	None.	The Regent Honeyeater was not identified at the site during surveys. Closest records of this species are approximately 9 km east / north-west of the site nearby Binalong	Approximately 20.86 ha of Box Gum CEEC present within project site. Potential foraging habitat is present within the project site. Potential foraging eucalypt species that occur within the project site include Yellow Box, Blakely's Red Gum, Red Box and Red Stringybark within Box Gum Woodland.	In areas of impact, infrastructure has been sited to primarily impact woodland habitat along the edges of larger patches of woodland and/or in isolated stands on slopes; however the works will not impact habitat connectivity. The construction of the wind farm would result in the loss of potential foraging habitat only (0.558 ha of Box Gum Woodland). Collision impacts are considered to be the most threatening risks to the Regent Honeyeater.	The extent of habitat within the region is unknown; however, at a minimum habitat would be linked to the distribution of Box Gum Woodland and native grasslands (refer to Box Gum Woodland above). No breeding habitat would be affected. Regional records across NSW indicate a strong presence of this species to the south, east and north-east of the project site in better quality habitat (i.e. National Parks). This better quality habitat includes Namadgi NP, Morton NP, Nattai NP and Blue Mountains NP.	Minor loss of foraging habitat Low collision risk	N/A – not recorded in project site
Swift Parrot	**Undertaken as part of Marilba BA (cluster 7):** Bird censuses were undertaken within representative areas of all vegetation, habitat and landform types. Bird census of 30 person minutes duration: 7 surveys **Total Effort:** 3.5 person hrs	**2007:** 26-28 March.	Not recorded in project site.	None.	The species has been recorded in Booroowa Shire to the north of the site. The closest record is approximately 10 km north-west of the project site (near McMahons Reef). However, only one record is known.	Primarily Box Gum Woodland (20.86ha). Potential foraging habitat for this species is present at the proposed site and it is possible that this species occurs there during its winter migration.	The Swift Parrot is a migratory species that can travel in large flocks, however, they are manoeuvrable fliers and do not breed locally, therefore the construction of the wind farm would result in the loss of foraging habitat only (0.558 ha of Box Gum woodland). The foraging habitat that would be affected is marginal and	The extent of habitat within the region is unknown; however, at a minimum habitat would be linked to the distribution of Box Gum Woodland and native grasslands (refer to Box Gum Woodland above).	Loss of foraging habitat and potential roosting habitat. This species only breeds in Tasmania; therefore breeding habitat would not be impacted upon. Low collision risk	N/A – not recorded in project site

Survey Effort (refer Appendix B)			*Distribution (refer Appendix C)*			*Habitat*			*Type of Impact*	*Distance of species to proposed works (within 500m)*
Species	*Effort and Methods*[1]	*Timing*	*Location and extent of species in project site*	*Number of Individuals located*	*Known populations within 10 km radius (see Figure)*	*Habitat within site (detail ha)*	*Extent of habitat impacted and quality (ha)*	*Habitat within region (general)*		
							wintering feed resources are not readily available. Woodland habitat in similar condition is relatively abundant in the surrounding area.			
Yass Daisy	**Marilba and Coppabella BAs:** Yass Daisy recorded during general flora survey, with broad observations regarding extent and abundance to assist project design. **Total Effort in Cluster 7 (Conroy's Gap Stage 2)–** Quadrats: 3 Random meanders: 3 Inspections: 3 **nghenvironmental (2009c):** Mapped broad area of occupancy and potential habitat at Marilba cluster 7. **SER:** Targeted search and mapping for Yass Daisy; 3-5 m wide transects in potential development area. An additional 10 metre wide corridor on the north-western side of the search area was also surveyed to confirm the suitability of a potential alternative cable route. No Yass Daisies were recorded in this additional survey area. **Total Effort** – 3 person hours for targeted survey.	**Part of Cluster 7 for Marilba BA:** **2007:** March **2008:** 16-22 September; 7 November. **SER:** **2012:** 15-18 October	The locations of the known Yass Daisy records for Conroys Gap Wind Farm are located in the south of the project area nearby a proposed underground cable and access track. **nghenvironmental (2009c)**: Mapped broad area of occupancy and potential habitat based on plant records and extent of good quality (*Themeda* dominated) grassland at cluster 7. Potential habitat on involved property is at least 50 ha. **SER:** Cluster 7 targeted searches and mapping within potential development area identified local distribution boundary to minimise impact. Potential habitat on involved property is at least 50 ha (refer **nghenvironmental** 2009). The population continues to the south, into the neighbouring property. *Note: Location of Yass Daisy populations are provided in Appendix F.*	Cluster 7 site, 325 plants in 14 colonies were recorded and mapped in the 1 ha (30 m x 340 m) search area, only in the Box-Gum Woodland-derived Grassland in the south-western half of the search area. The population continues to the south.	Records are scattered around the project site and appear to be more concentrated to the east near Conroys Gap and to the south within Burrinjuck Nature Reserve. The Yass Daisy was also observed to be scattered in roadside remnants and in a TSR beside Black Range Road south-east of the project site, east from GDA 661089 6143407.	Better quality Dry Forest, Box Gum Woodland and Derived Grassland, indicating lighter grazing/fertiliser history. Maximum potential impact area of moderate-good and good floristic condition BGW in new assessment areas is 1.25 ha, total within broader assessment area is not known.	All known populations avoided.	Yass Daisy is associated with a range of forest and woodland communities and secondary grasslands, usually sites with a light grazing regime (NPWS 2002). The extent of habitat within the region is unknown; however, at a minimum habitat is would be linked to the distribution of Box Gum Woodland and native grasslands (refer to Box Gum Woodland above).	The underground cable route was modified to avoid impacts to Yass Daisy plants and colonies at the Conroys Gap Wind Farm. The current proposed cable route was delineated as traversing potential Yass Daisy habitat, but not known habitat. If practicable, the cable would be installed as an overhead power line rather than a buried cable during construction, resulting in no impact to potential Yass Daisy habitat. Tracks would be constructed to avoid the Yass Daisy potential habitat in this area. Careful management of impacts in areas near Yass Daisy populations is also included in the management measures for the project to manage indirect impacts on this species.	Works may come within 10 m of Yass Daisy plants at some sites. Measures to prevent peripheral or indirect impacts would be applied, including fencing, erosion and sedimentation control, restoration and induction of staff.

KEY: Marilba BA – Marilba Hills Precinct Biodiversity Assessment (2009); **nghenvironmental (2009c)** – targeted Yass Daisy surveys; **SER** – Supplementary Ecology Report (2012).

[1] survey methods and outputs are consistent with the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft (DEC 2004)

[2] total person hours expended on flora survey covering all vegetation communities and condition classes

4 Relevant Impacts

4.1 Impact Summary - Including Collision

4.1.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The EPBC listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community ('Box Gum Woodland CEEC') was recorded at the site. In terms of floristic condition, the extent of this CEEC corresponds to vegetation mapped as Box Gum Woodland in moderate to good and good condition (5 class condition categorisation; nghenvironmental 2012).

The proposal has been modified to avoid impacts to vegetation belonging to the CEEC. Clearing of this community will occur for installation of an access track and underground cable only, however the maximum impact on Box Gum Woodland CEEC is minor and only affects a small area of Derived Grassland, but no overstorey species. The proposal has been modified to avoid impacts to vegetation belonging to the CEEC in most cases; however in this instance where avoidance could not be achieved the underground cable has been sited to traverse the smallest area possible to minimise impact to Box Gum Woodland Derived Grassland CEEC. The infrastructure will also be micro-sited with input from an ecologist to minimise impacts within this area. A Statement of Commitment ensures that this will be a condition of development in this area. The proposal would impact a maximum of 0.1 ha Box Gum Woodland CEEC. The project site comprises about 20.9 ha of Box Gum CEEC of which only 0.4% of this CEEC would be affected. Appendix E details the location of Box Gum Woodland CEEC impact areas.

Impact Summary

An EPBC assessment of significant impact was undertaken for this CEEC, with results indicating that:

- The proposal would not significantly add to existing fragmentation in the study area.
- The project would avoid impacts to the CEEC as far as possible; the proposed action has been revised to avoid and minimise development in these areas.
- The majority of works would be undertaken in poor-moderate condition native pasture, representing highly degraded and modified habitat, of which does not belong to the Box Gum Woodland CEEC.
- The works would require site levelling in discrete areas and drainage which would affect soils, hydrology and ecological functions outside the CEEC. However, these impacts are expected to be highly localised, and are not expected to significantly affect the CEEC beyond the works boundaries.
- Weed control, fire prevention protocols and soil and water protection measures would ensure that impacts beyond the works sites are not significant, and do not cause a substantial change in species composition in the CEEC outside the site.
- Soil disturbance undertaken in non-EEC areas may stimulate germination of weeds, posing a risk to nearby CEEC, however considered manageable using best practice weed management which form a part of the project's Statements of Commitment.

The direct removal of CEEC is limited to only one site. Input from an ecologist will aid to minimise impacts in this area where avoidance is not possible. It is considered that the minor clearance coupled with the implementation of specific measures the proposed action will not have a significant impact on this community (refer Section 5 for management measures).

4.1.2 Yass Daisy – loss of habitat

Known records and population

The threatened Yass Daisy was identified at the proposed site during the initial biodiversity assessment and targeted field surveys in 2009. During the original biodiversity assessment (Marilba) it was noted that the species appeared widespread and the population size was likely to be in the hundreds, potentially thousands at the site (Refer Table 3-3). Additional surveys, undertaken in October 2009 (and documented within Section 2.2.3 of the SER -

nghenvironmental 2012) for new areas of development did not identify this species in the additional areas added to the project. The location of existing populations within the project site and the general number of individuals was verified to provide greater detail on this issue. These are listed in Table 2-2 and defined in Appendix F.

Impact summary:

An EPBC assessment of significant impact was carried out for this species in the Marilba BA (nghenvironmental 2009a). Measures were developed to protect this species from significant impact, largely the undertaking of additional surveys, mapping and avoidance of known populations. The latter has now been accomplished, and is documented within the SER (**ngh**environmental 2012). As a result, the proposal will not impact any known populations of this species. Specific modifications to avoid impacts to the Yass Daisy Conroys Gap Stage 2 precinct are detailed below. Careful management of impacts in areas near Yass Daisy populations is also included in the management measures for the project, to manage indirect impacts on this species.

Conroys Gap Stage 2 precinct

The locations of the known Yass Daisy records for Conroys Gap Wind Farm are located in secondary grasslands south-west of the turbine sites. Based on targeted search results and mapping, the proposed cable route for Conroys Gap, can avoid direct impacts to the Yass Daisy populations. The Yass Daisy population would be identified and protected during the construction and operation phases, and special rehabilitation measures would be applied for works in the vicinity of the population.

The one hectare search area (30 metre x 340 metres) included equal proportions of grassland derived from Box-Gum Woodland and Broad-leaved Peppermint – Brittle Gum dry grass forest. Approximately 325 plants in 14 colonies were recorded in the search area, only in the Box-Gum Woodland-derived grassland in the south-western half of the search area. An additional 10 metre wide corridor on the north-western side of the search area was also surveyed to confirm the suitability of a potential alternative cable route. No Yass Daisies were recorded in this additional survey area.

4.1.3 Golden Sun Moth – loss of habitat

Known records and population

Golden Sun Moth populations were not known within or nearby the project site when the original assessments were undertaken. However, in the intervening period since the original biodiversity assessments for the Marilba precinct (2009), the species distribution has increased and it is has been recorded north, south and east of the project site. The closest documented record is approximately 3 km south-east of the proposed underground cable (powerline alignment). Targeted surveys were undertaken for this species over a five day period (20, 25, 26 November and 2 and 3 December 2013) across the Yass Valley Wind Farm precinct, including Conroys Gap. Surveys at Conroys Gap were undertaken on the 20 November at five turbine locations.

All sites were surveyed using a random meander method or point count method in accordance with prescribed survey techniques outlined in Survey Guidelines for Golden Sun Moth (Conservation Planning and Research, ACT Government, November 2010). However the exception is that multiple site visits were not undertaken during this survey period.

The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Yass, Young and Tumut. The species is reported from 48 sites in NSW, with 32 sites occurring in the ACT (DSEWPaC 2013). Forty-eight Bionet records of the species are known for the Murrumbidgee Catchment region, with the heaviest concentrations north of Canberra towards Yass. In the intervening period since the original biodiversity assessments for the Marilba precinct (2009), the species distribution of the Golden Sun Moth has increased and it is has been recorded north, south and east of the project site. Targeted surveys for this species have revealed its presence at the Conroys Gap Stage 2 precinct. Four male individuals were recorded between the two most northern turbine locations (turbine 131 and 136).

Habitat loss impacts

The Golden Sun Moth has shown a preference for natural temperate grasslands or secondary grasslands (derived from Box Gum grassy woodland) that are dominated by a low and open cover of native wallaby grasses (*Rytidosperma spp.*,

formerly *Austrodanthonia spp.*) (OEH 2013b). The Golden Sun Moth has also been recorded in degraded and weed infested patches of grasses dominated by Redleg grass (*Bothriochloa macra*), spear grasses (*Austrostipa spp*.), weeping grass (*Microlaena stipoides*) and the introduced Chilean needle grass (*Nassella neesiana*) (OEH 2013b).

Potential habitat for this species is present at the project site and is classified as Box Gum Woodland, Derived Native Grassland, and pasture (supporting native species) in any condition (poor to good). The proposal will affect a combined total of approximately 10.74 ha within these vegetation types. Records indicate that not all areas of potential habitat are used by the moth.

The Golden Sun Moth was recorded at one location within the Conroys Gap Stage 2 precinct site. All observations correlated with grassland that was either dominated or comprised a high proportion of Wallaby Grass. Across the Yass Valley Wind Farm site, moths were observed in a variety of topographic situations including broad grassy valleys, low rolling grassy hills, mid slopes and rock hill top areas.

The proposal will affect a combined total of approximately 10.74 ha within these vegetation types. The pattern of clearing is considered discrete; linear tracks and relatively small footings for power lines, larger footings for turbines, spaced at around 200 – 300m apart. The infrastructure layout has been refined over the life of the project in response to constraints including biodiversity constraints; hence the majority of the impact from the proposal avoids areas of better quality vegetation.

It is considered that the Golden Sun Moth has potential to be impacted from the proposed action from habitat loss or direct mortality to individuals during the construction phase, in areas where it occurs within the development footprint.

Movement and collision risk

Only the male moth regularly flies, but is thought not to travel beyond 100 m from suitable habitat (Clarke & O'Dwyer 2000). Male moths fly only in bright sunshine during the warmest part of the day (10:00 – 14:00; 24 hr. time), although moths have been recorded flying as late as 16:00 under favourable conditions. The local regional flying season is relatively short, being about six to eight weeks between November and December, depending on seasonal conditions (OEH 2013b).

Given the limited movement of the Golden Sun Moth there are no collision risks for this species.

Indirect operational impacts: shading

Additionally, shading from infrastructure can affect the microclimate of habitat and may reduce the suitability of habitat, through lower temperatures. The relevant infrastructure consists of turbines, power poles and substations. In all cases, the shading that would fall on areas of adjacent pasture would be considered minor (most shading would be contained with hard stand areas and fenced yards or would be negligible, in the case of the power poles). Operational risks are therefore considered low.

Impact summary

Targeted surveys for the Golden Sun Moth have revealed the species is present within the Conroys Gap Stage 2 precinct. The species was recorded along a mid to high slope area, dominated by Wallaby Grass. The species was found in one location at Conroy's Gap. It was not recorded at four of the five sites that provide suitable habitat. The removal of 10.74 ha is a precautionary approach as surveys were only conducted over one day. Other surveys in the region have revealed that this species has increased in numbers and distribution and there is now a strong population with the Yass Valley region.

Further preconstruction surveys will be used to minimise impacts and micro-site infrastructure to manage impacts to this species. Impacts to this species will be offset and managed, therefore it is unlikely that the proposal would result in a significant impact at the population level for this species.

It is considered that the Golden Sun Moth has potential to be impacted from the proposed action from habitat loss or direct mortality to individuals during the construction phase, in areas where it occurs within the development footprint. Operational risks from collisions or shading would be low. A management plan based on further preconstruction surveys would be developed to minimise impacts where possible and offset the residual impacts in areas where this species is known to occur.

4.1.4 Superb Parrot – loss of foraging and breeding habitat, collision risk

Known records and population

The Superb Parrot has been recorded within the locality (north of the Hume Highway) and was observed driving between field survey sites within mature woodland along Illalong Road, 8 km west of the project site; however, the species was not recorded within the vicinity of the proposed turbine sites.

The project area intersects the South-west Slopes of NSW Important Bird Area (IBA), which includes the localities of Bowning, Boorowa, Rugby and the town of Yass (refer Figure 2-1). The IBA supports a regional population of the Superb Parrot and several records exist nearby the project site (Appendix D). The project site is located south of the IBA, but borders its eastern arm nearby Yass.

Records of flocks of between 20 and 50 birds were made in the Yass region only three times during spring and early summer of 1998; most records were of single birds or pairs (ACT Government 1999). The total population has been estimated at 5,000–8,000 birds (DECCW in prep.) and 6,500 adult birds (Garnett & Crowley 2000). Regional estimates include 'several 'several thousand' in the South-west Slopes (NSW) including 50–100 birds in the ACT (DECCW in prep.) (Baker-Gabb 2011).

In a survey of road verges on the NSW south-western slopes, there were 2.5 possible nesting trees per kilometre whilst just prior to the start of the breeding season there were 0.62 birds per kilometre (Davey, & Purchase 2004). While Manning et al. (2004) cites 106 nest trees for the South-west Slopes.

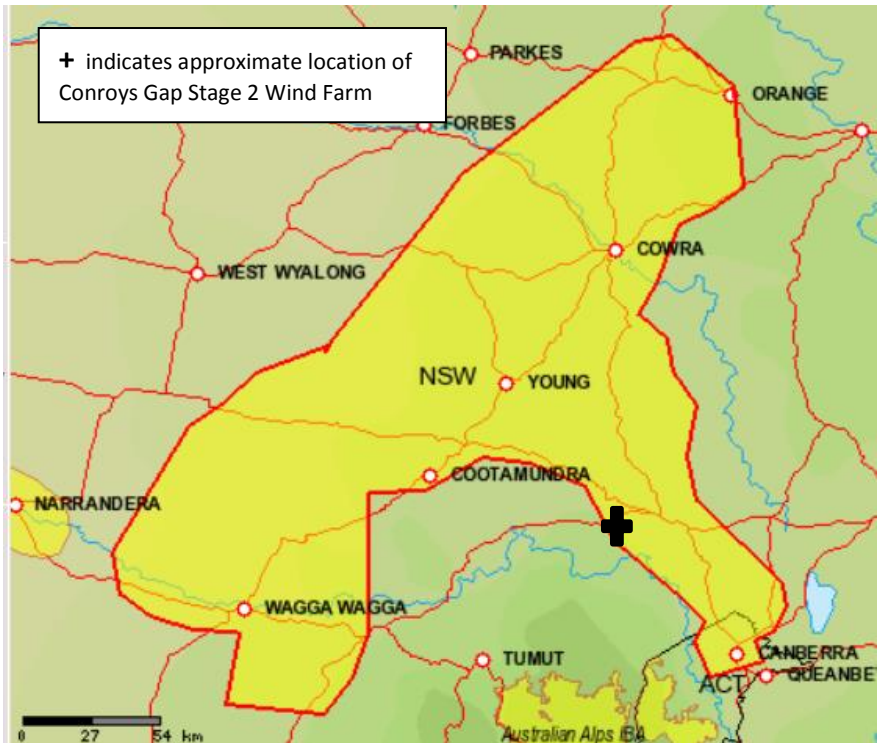

Figure 4-1 Location of South-west Slopes Important Bird Area (source BirdLife Australia 2007)

Habitat loss impacts

Across its range, the Superb Parrot uses two distinct habitat types for breeding: riverine forests in the Riverina, and Box Gum woodlands in the tablelands and slopes (Baker-Gabb 2011; Webster 1988).The Superb Parrot forages in Box Eucalypt Woodland, particularly that dominated by Yellow Box or Grey Box. Large flocks of adult and immature birds roam widely in search of food, and may be observed in various habitats at this time (Webster 1988).

Suitable foraging, nesting and breeding habitat for this species is largely absent within the project site; the moderate condition Box Gum Woodland and Derived Grassland may provide some marginal foraging habitat as the species feeds in trees and understorey shrubs and on the ground. Understorey food species include the Common Wallaby-grass

(*Austrodanthonia caespitosa*), and numerous Acacia species. The proposal would result in removal of 0.65 ha of this habitat.

Superb Parrots use woodland remnants to forage and move across the landscape and are less likely to cross extensive open areas. In the locality, woodland remnants largely coincide with roadside vegetation; feeding areas and flying routes are more likely to correspond with valleys and low hills supporting tree cover and remnant woodland along roadsides, rather than with the open and fragmented vegetation on ridge top turbine sites. During the field surveys for the Yass Valley Wind Farm (Marilba and Coppabella), the Superb Parrot was observed more commonly along roadsides confirming that the species uses these lower lying landscapes as corridors to travel through their home ranges. More detailed Superb Parrot surveys for a project nearby (Rye Park) that simultaneously surveyed ridges and lower landscape locations support this preference for lower landscape movements.

Habitat removal, particularly the removal of hollow-bearing trees in mature woodland remnants, may be a potential risk for this species, and could affect breeding of the local population. Blakely's Red Gum is the main source of nesting hollows (Davey 1997) and nest trees tend to be close to watercourses (Webster 1988), with the species being faithful to traditional nest sites (Webster 1988). Nest trees tend to be older, often affected by dieback with little regeneration (Manning 2004).

Habitat removal, particularly the removal of hollow-bearing trees in mature woodland remnants, may be a potential risk for this species, and could affect breeding of the local population. Mature trees are absent to rare within the project site given that the location of the site is in predominantly disturbed grazing land.

Mature woodland and areas where dense numbers of hollows have been recorded have been designated as high constraints and the proposal commits to avoiding them in all but a select number of cases (such as the micrositing of power pole footings and access tracks). Furthermore, a commitment of the project is to avoid hollows, where possible, and offset any hollow removed with a nest box or re-mounted hollow (Refer to Offset Strategy, included in the project's SER and included with this submission as Appendix G).

Movement and collision risk impacts

Superb Parrots fly in large flocks and have low fecundity and are at risk of population-scale impacts as a result of blade-strike. Little is known about seasonal migration routes for the Superb Parrot; it is assumed that they move west and then north after the breeding season (A. Manning, CRES ANU, pers. comm.). Webster (1997; 1998) states Superb Parrots generally move away from their breeding habitat in mid-January and the Parrot is rarely observed on the inland slopes of NSW during winter, with the few birds seen usually being breeding pairs (Webster 1988). Most of the breeding population from the inland slopes appears to move to the eucalypt-pine woodlands on the plains of west-central and north-central New South Wales (Webster 1988; DECCW in prep.).

Regional records of the Superb Parrot are concentrated to the west and north of the project site, but are less frequent nearby the project site. The records suggest the parrot relies on movement to the west of the project site confirming the assumption of Webster 1988 that the breeding population move west from the inland slopes (Figure 2-2).

Local migration routes are not known nearby the project site. The species may forage up to 10 km from nesting sites and at the micro scale, distribution and abundance is thought to be influenced by tree cover and species composition (Webster 1988; Garnett1992a). When making local foraging movements, the Superb Parrot avoids open areas on foraging flights and while the species uses woodland remnants as corridors, they rarely cross extensive open ground (Webster 1988, Davidson and Chamber 1992, Webster and Ahern 1992, Higgins 1999).

Because of the extent of clearing and fragmentation, the majority of the turbine sites are unlikely to provide quality foraging habitat for the Superb Parrot. There is limited flight height data relating to the Superb Parrot to determine if this species is known to fly within the rotor-swept area (i.e. collision zone). However, recent flight path mapping for the Superb Parrot at a nearby wind farm at Rye Park by **ngh**environmental in 2013 investigated flight heights of this species over a three-day survey; results indicate the species was recorded flying below or at canopy height (i.e. below the rotor-swept area) approximately 95% of the time (unpublished data, **ngh**environmental). A variety of other parrot species are known to fly at turbine blade height at times, although the great majority of recorded flights are also reported to be below the rotor-swept area (Biosis Research 2006). Flights between roost/nest and foraging areas are likely to be at tree canopy level. Superb Parrots have been observed flying high over open areas in the South-West Slopes. However, they do tend to occur more in the lower elevation/relief parts of the landscape where the Box Gum

Woodlands, including scattered paddock trees, are located; this environment is where nest trees and food is likely to occur (A. Manning, CRES ANU, pers. comm.). As a result, the frequency of parrots flying high over the turbine ridge tops is likely to be low reducing risk of collision. This assumption was confirmed within the flight height mapping survey undertaken at Rye Park Wind Farm in November 2013.

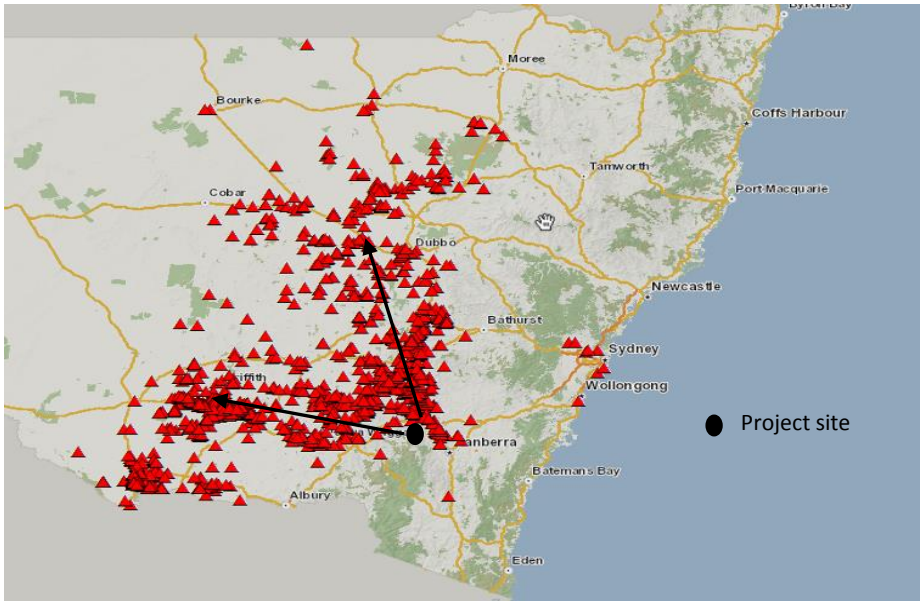

Figure 4-2 Regional NSW records for the Superb Parrot

Impact summary

An EPBC assessment of significant impact was undertaken for this species, with results indicating that:

- The construction of the wind farm would result in the loss of 0.65 ha of Box Gum Woodland foraging habitat.
- Limited breeding habitat is available in the form of hollow-bearing trees; however the proposal has largely avoided intact woodland vegetation with hollow-bearing trees and removal of any hollows will be offset.
- The habitat that would be affected is generally degraded and woodland habitat in similar condition is relatively abundant in the surrounding area.
- Collision risks from migration events or local movements are low given, a) the species migration route appears to primarily be west of the project site (as shown by regional records), and b) the species is unlikely to move across degraded ridge-tops and would use remnant patches along roadsides as 'stepping stones' during migratory or foraging movements.

It is considered that with the implementation of specific measures, particularly those related to hollow-bearing tree protection, the proposed action is unlikely to have a significant impact on the Superb Parrot (refer Section 5 for management measures). A commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required.

4.1.5 Swift Parrot – loss of foraging habitat, collision risk

Known records and population

The Swift Parrot was not identified at the project site during surveys. The species has been recorded in Booroowa Shire to the north of the site. The closest record is approximately 10 km north-west of the project site (near McMahons Reef). Potential foraging habitat for this species is present at the proposed site and it is possible that this species occurs there during its winter migration.

As for the Superb Parrot, the project area intersects the South-west Slopes of NSW IBA. The IBA supports a significant wintering population of the endangered Swift Parrot. However, records within 10 km of the project site are few (Appendix D). The location of the mapped IBA boundaries (Figure 4-3) and the regional records (Figure 2-3) indicate the project site is located nearby and adjacent to known populations, but does not support a core population of this species.

Habitat loss impacts

The Swift Parrot has potential to be impacted from a minor loss of foraging habitat. The moderate condition Box Gum Woodland and small areas of Long-Leaved Box woodland are the most likely vegetation type this species is expected to inhabit if it were to occur within the project site as these vegetation types provide potential foraging habitat including feed trees of the White Box, or Yellow Box and the winter-flowering Long-leaved Box. However, due to clearing associated with long-term grazing the quality of the Box Gum Woodland to be affected by the action is marginal and unlikely habitat for this species. Long-leaved Box stands were scattered on side slopes and consisted of regrowth; better habitat is likely to be present in timbered lowland areas.

While the proposal will affect a small amount of moderate condition Box Gum Woodland (0.558 ha) this impact is not considered to have a significant impact on the species. Cumulative and collision impacts are considered to be the most threatening risks to the Swift Parrot

Movement and collision risk

The Swift Parrot breeds in Tasmania and Furneaux Group islands, migrating to the mainland between autumn and winter, where it becomes nomadic in response to the availability of blossoms and other food (Pizzey et al 2006). Wintering flocks may remain in a district for weeks, returning as a flock to the same tree each night for roosting.

Movement pathways used by Swift Parrots throughout their range are not well understood. Although large scale movement trends have been demonstrated from Tasmania to mainland Australia, it is not known if long distance movements are predominantly undertaken in groups, nocturnally or diurnally, at specific heights or what triggers such movements (Saunders et al 2011).

The closest regional records are concentrated to the west and south-west of the project site within the Upper Slopes sub-region of Murrumbidgee CMA, although records are not known directly east of the project site, but are abundant on the coast (Figure 2-3). The records suggest the parrot relies on movement west and east of the project site, but is not heavily reliant on movement directly within the project site which is most likely attributed to the lack of adequate foraging habitat in these more heavily grazed areas.

As the Swift Parrot is a migratory species that travels in large flocks, there is potential for collision with turbines. However, the project site does not appear to be directly located within the migration pathway of the species, as depicted from known regional records of the species in NSW and the lack of records nearby the project site. It is therefore expected that if the parrot were to occur within the project site it would move lower through the landscape during foraging movements.

The movement and collision risk is expected to be the same as detailed for the Superb Parrot. That is, flights between roost and foraging areas are likely to be at tree canopy level and the species may fly at turbine blade height as they migrate to other woodland and forest sites. However, the Swift Parrot is noted as a manoeuvrable flier and frequency of flights over the turbine ridges is likely to be low given the lack of mature woodland habitats within these predominantly cleared and degraded areas; hence collision with turbines is expected to be low.

Known deaths of Swift Parrots have been related to window strike, fence strike or vehicle impact and are associated with situations where such structures are in close proximity to sites of concentrated foraging by the species; the project site is not known to be located within a primary foraging site. While more recent data is lacking for collision impacts from wind farms, no Swift Parrot deaths have been attributed to collisions with turbines within initial studies (Smales, 2005). An assessment that modelled the potential collision rate of 39 wind farms located in the distribution range of the Swift Parrot concluded that the potential combined blade-strike impact of all of these wind farms would not be significant; the modelled results equated to slightly more or less than one parrot killed due to wind turbine collision every ten years (Smales, 2005).

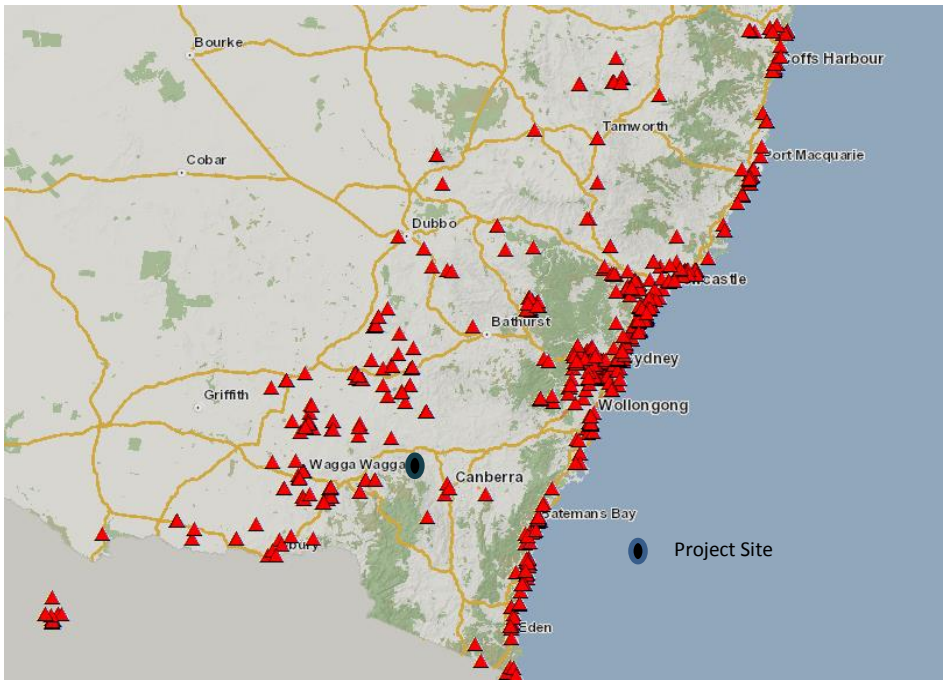

Figure 4-3 Regional NSW records for the Swift Parrot

Impact summary

An EPBC assessment of significant impact was undertaken for this species, with results indicating that:

- The Swift Parrot is a migratory species that can travel in large flocks, however, they are manoeuvrable fliers and do not breed locally, therefore the construction of the wind farm would result in the loss of foraging habitat only (0.558 ha of Box Gum Woodland)
- The foraging habitat that would be affected is marginal and wintering feed resources (Long-leaved Box) are not readily available. Woodland habitat in similar condition is relatively abundant in the surrounding area.
- Collision risks from migration events or local movements are low given the project site does not appear to be directly located within the migration pathway of the species due to lack of records in the locality.
- The species is unlikely to move across degraded ridge-tops and would use remnant patches along roadsides as 'stepping stones' during migratory or foraging movements.

It is considered that the proposed action is unlikely to have a significant impact on the Swift Parrot. A commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required.

4.1.6 Regent Honeyeater – loss of foraging habitat, collision risk

Known records and population

The Regent Honeyeater was not identified at the site during surveys. Closest records of this species are approximately 9 km east / north-west of the site nearby Binalong (Appendix D).

There are only three known key breeding regions for the Regent Honeyeater and include: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. The NSW breeding populations are located significantly north of the project site, with the Capertee Valley population being the closest (approximately 230 km north) (OEH 2013b). Generally, in NSW the distribution of the Regent Honeyeater is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. Known records indicate the project site does not support a core population of this species. No breeding habitat would be affected.

Habitat loss impacts

Regent Honeyeaters are generalist foragers, which feed mainly on nectar from a wide range of eucalypts and mistletoes (Blakers et al 1984) and the project site does not support a variety or large number of different flowering feed trees. Potential foraging habitat is present within the project site and it is considered possible that this species could occur there. Potential foraging eucalypt species that occur within the project site include Yellow Box, Blakely's Red Gum, Red Box and Red Stringybark within Box Gum Woodland. However, the habitat supporting these eucalypt species is generally degraded and trees are largely scattered within their distribution within the project site. The proposal only affects a minor area of moderate condition Box Gum Woodland (0.558 ha) that is not considered optimal habitat for this species. In areas of impact, infrastructure has been sited to primarily impact woodland habitat along the edges of larger patches of woodland and/or in isolated stands on slopes; however the works will not impact habitat connectivity.

Despite the species mobility, local populations appear not to persist in small remnants (less than 200 ha) (Garnett & Crowley 2000). The largest remnant within the locality is approximately 140 ha suggesting that while some habitat maybe available within the wider area, habitat quality is marginal and the species is therefore unlikely to be a permanent resident of the project site.

Movement and collision risk

The Regent Honeyeater can undertake large-scale nomadic movements across the landscape, also moving in flocks and movement patterns are often linked to availability of resources (Pizzey et al 2006). It can be assumed that the species may travel through the project site to other foraging grounds and there may be a risk of blade-strike to this species during the operation of the wind farm.

Little information is available on the migration patterns of this highly mobile species; however regional records across NSW indicate a strong presence of this species to the south, east and north-east of the project site in better quality habitat (i.e. National Parks) (Figure 2-4). This better quality habitat includes Namadgi NP, Morton NP, Nattai NP and Blue Mountains NP. It is expected the movement of this species would commonly occur through this connection where better quality foraging resources exist. Research in grazing landscapes in southern NSW showed a pronounced trend for nectarivores to move along densely vegetated areas, and use the same route for return journeys (Fischer and Lindenmayer 2002a).

Additionally, the species prefers the wettest, most fertile sites for foraging such as along creek flats, broad river valleys and foothills (Pizzey 2006). This suggests that if present, Regent Honeyeaters are more likely to use valleys, roadside remnant corridors and low hills than the disturbed high ridges of the proposed turbine sites to reach foraging habitat.

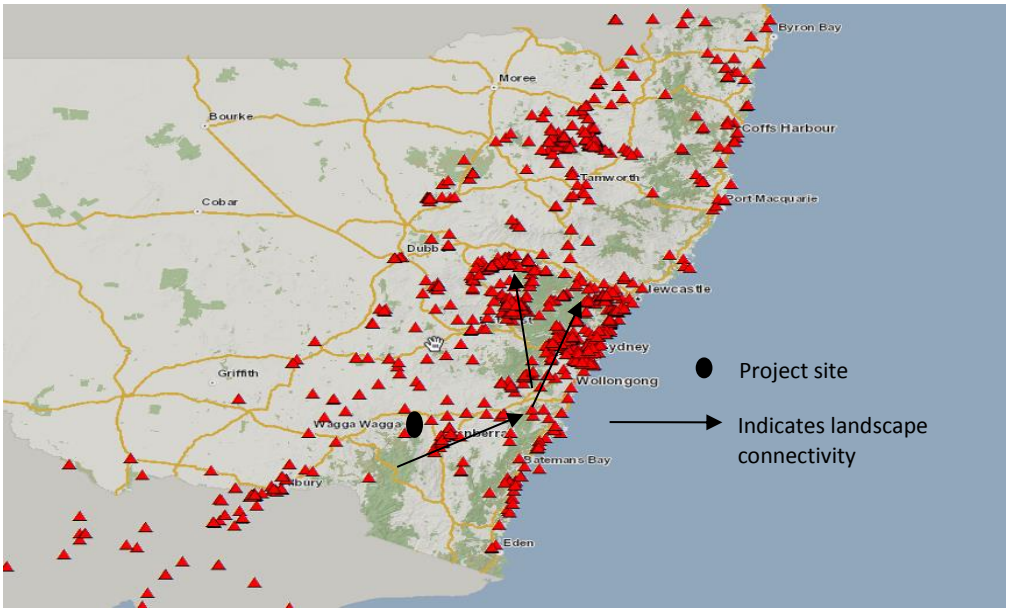

Figure 4-4 Regional NSW records for the Regent Honeyeater

Impact summary

An EPBC assessment of significant impact was undertaken for this species, with results indicating that:

- The construction of the wind farm would result in the loss of potential foraging habitat only (0.558 ha of Box Gum Woodland).
- The lack of records in the locality suggests the potential foraging habitat that would be affected is marginal and the abundance of feed trees is low in the affected habitat.
- The proposal would impact woodland habitat primarily along the edges of larger patches of woodland and in isolated stands on slopes, but would not impact habitat connectivity.
- The Regent Honeyeater can undertake large scale nomadic movements and travel in large flocks, however, collision risks from migration events or local movements are low given the project site does not appear to be directly located within the migration pathway of the species due to lack of records in the locality.
- Regent Honeyeaters are more likely to use valleys, roadside remnant corridors and low hills than the disturbed high ridges of the proposed turbine sites to reach foraging habitat.

It is considered that the proposed action is unlikely to have a significant impact on the Regent Honeyeater. A commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required.

4.2 Cumulative impacts

There are three operating wind farms within approximately 65 km of the project area. These comprise a total of 54 wind turbines (Cullerin Range Wind Farm: 15, Gunning Wind Farm: 31, Crookwell Wind Farm: 8). Gullen Range Wind Farm is currently under construction: 80 turbines approximately 55km from the project area. Several other wind farms are proposed within a maximum distance of 60 km from the project area including Yass Valley Wind Farm, Rugby Wind Farm, Bango Wind Farm, Conroys Gap Wind Farm, and Rye Park Wind Farm).

The cumulative impacts of all operating wind farms within the region may have adverse impacts on threatened or migratory species through loss of habitat, collision risks resulting in mortality, creating barriers to movement, therefore limiting foraging or breeding movements on a regional scale, and/or affecting large-scale migrations. However, the biggest concern appears to stem from potential ongoing bird and bat collision with operating turbines (Parsons & Battley 2013).

The cumulative operational impacts of wind farms for this specific area are largely unknown. The difficultly in drawing conclusions about cumulative operational risk is highlighted in a report commissioned by the Commonwealth Department of Environment and Heritage (Biosis 2006), Wind Farm Collision Risk for Birds: Cumulative Risks for Threatened and Migratory Species (species considered included Swift Parrot and Tasmanian Wedge-tailed Eagle). Based on collision risk modelling and population viability analysis, the assessment of significance of cumulative risk from all wind farms operational in Australia at that time (wind farms operational in 2005) was inconclusive due to variation in site specific factors and poor scientific knowledge of bird populations. With this background of uncertainty, precautionary management measures implemented as part of this proposal become more important.

A commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required. It will also provide more locally relevant data upon which to base future management actions.

4.2.1 General cumulative habitat loss impacts

The nature of wind farms is that they are not suited to wooded environments and infrastructure is located primarily within degraded and already fragmented landscapes. The location of the Conroys Gap Stage 2 Wind Farm is such that it has been sited, through several iterations of the design process, to avoid high value biodiversity areas supporting good condition woodland or threatened species habitat resulting in the majority of infrastructure being sites in exotic or grassland habitat. On this basis, the proposal is not considered to significantly contribute to cumulative habitat loss impacts, especially considering vegetation loss will be offset and long-term management of the offset areas within an already degraded landscaped will maintain or improve biodiversity within the area.

4.2.2 General cumulative collision risk impacts

The operational and proposed wind farm localities in the district may involve overlapping bird territories and bird migration routes. For this reason, wind farm biodiversity impact assessment considers at length the differing risks of species with potential to occur at the height of operational wind turbines, as well as the habitat features that may contribute to collision risks (collision risks for affected species have been discussed in Section 4.1 above and summarised below).

Within the locality of the project site, intermittent woodland occurs along Jugiong Creek and its smaller tributaries which create a linear corridor to the Murrumbidgee River, and eventually to Lake Burrinjuck (approximately 25km from the site) and forest woodland reserves to the south. The principal flight paths for woodland bird species are likely to follow slopes and lowland areas carrying remnant woodland and water sources. The locality supports woodland remnants which occur outside the development envelope. The project site features one large woodland remnant which occur outside the development envelope:

- The north-south remnant west of the turbine areas.

This woodland patch, along with others within the locality, are likely to contribute to local bird movement across the district. However, only sparse, disturbed woodland remnants occur on the ridges where turbines have been proposed. The heavily cleared nature of the involved properties, and the turbine ridges in particular, would appear to make their frequent use for bird migration unlikely. Many woodland birds that occur in the region are unlikely to venture far from large remnants and many more species, such as the Superb Parrot and Regent Honeyeater, rarely cross extensive open areas (Garnett and Crowley, 2000; Fischer and Lindenmayer, 2002). Birds moving at tree canopy height through these corridors are unlikely to be affected by the wind turbines located on adjacent ridges.

Based on the quality of available habitat (as described above) which has primarily been cleared in the local area and elsewhere in the district (especially to the west), and the absence of major wetlands, with the closest being Lake Burrinjuck, the project site is not likely to be located on a major migratory route for wetland birds or seasonally migrating birds.

4.2.3 Specific cumulative impacts – affected species / communities

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The infrastructure layout has been designed to primarily avoid impact to good condition CEEC and management measures prescribe that direct removal of Derived Grassland CEEC is limited to only one site where an underground cable and access track is proposed.

Residual impacts to the Box Gum Woodland CEEC will be mitigated through an offset package developed specifically to ensure an overall 'improve or maintain' environmental outcome for the project. A strategy to develop this offset is included as Appendix G and includes the following components:

- How will offsets be calculated
- When will the offsets be implemented and delivered
- Where will the offsets be defined
- How will the offsets be managed and secured

Proposed offsets will contribute to the long-term protection and improvement of the Box Gum Woodland CEEC in the locality and, by contributing to landscape connectivity, within the wider region also.

Yass Daisy

The infrastructure layout (and management prescriptions developed for these species) will ensure all Yass Daisy populations are avoided. Therefore, the proposal will not contribute to a cumulative impact on this species.

Golden Sun Moth

The Golden Sun Moth has been found at one location within the Conroys Gap Stage 2 precinct. It was recorded along a mid to high slope area between two turbine locations in the north (turbine number 131 and 136). This species was also recorded at the Yass Valley Wind Farm site in several areas onsite, both within and outside the development footprint.

It is also now being recorded at other wind farm sites nearby (Rye Park, Bango) and is therefore more regionally abundant than previously assumed. The pattern of clearing and ability to microsite infrastructure to minimise impacts on habitat for this species as well as the commitment to offset, ensures that cumulative impacts will be managed. In the long term, these regional wind farm projects will provide ongoing biodiversity improvements in the form of managed offset lands. Given the context of land degradation, this is considered a benefit of the project.

Superb Parrot, Swift Parrot, and Regent Honeyeater

The cumulative impact from loss of habitat associated with this proposal is considered negligible for the Swift Parrot and Regent Honeyeater, given that these species do not breed within the project site and they are unlikely to rely on the low quality foraging habitat available, as evidenced by the lack of records in the locality. However, cumulative impacts from loss of habitat within the region for the Superb Parrot are probable.

The location of the proposed wind farm turbines on largely cleared ridge top sites already compromised from long-term grazing, coupled with avoidance of clearing good condition woodland, should restrict the cumulative impacts for the Superb Parrot, which has been noted to utilise habitats in the lower-lying areas and along roadsides. The offsetting of vegetation losses and hollow-bearing tree removal with the long term protection of similar vegetation in the study area will reduce the cumulative effects of the proposal on loss of habitat for this species. Managed offsets that accompany the project, will provide areas protected from degradation and managed for biodiversity improvement, as stated above.

The potential of the operational wind farm to affect movements or increase mortality rates through collision impacts for the Superb Parrot, Swift Parrot and Regent Honeyeater is considered low. Based on the discussion of bird movements for the Superb Parrot, Swift Parrot and Regent Honeyeater, visits from migratory or nomadic species are expected to be either infrequent and sporadic, or not within the area of impact. The wind farm is not expected to significantly affect migratory or nomadic species such that populations would be at risk, and is therefore not considered to add to the cumulative impact of these species for collision risk. This project, like others proposed at this time for the region, includes the commitment to an operational bird and bat management plan will address the uncertainty and provide a mechanism for operational management, if required.

4.2.4 Positive cumulative impacts

The construction and operational biodiversity impacts of the wind farm take place in a context of existing (and adds to the existing environmental impacts resulting from) land clearing, agricultural activities, weed and pest animal infestations and drought conditions. The district has experienced extensive losses to ecosystem integrity and stability. Woodland and grassland communities in particular, which coincide with prime agricultural land, and riparian and wetland communities have been heavily simplified and destabilised. It is likely that many woodland flora and fauna species have become locally extinct, and many are in continuing decline. It is important to note however, that wind farm development is preferable in such areas and that there are opportunities to improve these landscapes, rather than propose developments in pristine areas of higher conservation value.

Positive cumulative impacts are also relevant to wind farm development and are more certain:

- Provision of an alternative income stream to involved landowners; this may positively impact grazing practices and restoration works.
- Provision of offset lands, calculated to ensure an overall 'maintain or improve' biodiversity outcome; this ensures that relevant areas will be protected and managed in the locality (detailed further in Section 6).
- Assisting the transition to renewable energy sources with their resultant greenhouse gas emission benefits. Particularly for species west of the Great Dividing Range, projected climatic extremes are likely to be detrimental.
- Additional data collected from operational bird and bat management plans to provide more locally relevant data upon which to base future management actions.

4.3 Will impacts be unknown, unpredictable or irreversible

The direct loss of habitat for the affected species is detailed in Table 3-3 and is considered to be relatively accurate, being based on the available literature of habitat preferences, known records for the species / communities and extensive vegetation mapping for the project site. However, the extent of habitat within the region is difficult to define and is based on broad mapping of the region. This is particularly evident for the extent of Box Gum Woodland CEEC in the region. However, impacts to this community have been largely avoided and knowledge of its regional distribution is not vital in this context.

The Golden Sun Moth can be found in a variety of habitats including grassy Box-Gum Woodlands, natural temperate grasslands, and open habitat dominated by several wallaby grass species. It has also been recorded in degraded and weed infested patches of grasses dominated by Redleg grass (*Bothriochloa macra*), spear grasses (*Austrostipa* spp.), weeping grass (*Microlaena stipoides*) and the introduced Chilean needle grass (*Nassella neesiana*) (OEH 2013). It has now been recorded within the Marilba precinct area of the Yass Valley Wind Farm site, and in the northern section of Conroys Gap Stage 2 precinct; however, it could occur in additional areas that were not surveyed. As this species is also now being recorded at other wind farm sites nearby (Rye Park, Bango), it is more regionally abundant than previously assumed. To manage the degree of uncertainty with regard to the significance of loss of habitat, a management plan based on further preconstruction surveys would be developed to minimise impacts where possible and offset the residual impacts in areas where this species is known to occur.

Bird species that are threatened (small populations), already compromised from significant habitat loss, or those that may move in large flocks, such as the Regent Honeyeater, Superb Parrot and Swift Parrot, are considered to be at higher risk of collision from artificial structures, such as wind turbines. Mortality impacts through collision for nomadic flocking species is considered a high risk for wind farms as it could affect the species at a population level by removing a significant proportion of the population during migration events. While it has been assessed that the risk of collision for the affected bird species is considered low, there is still uncertainty regarding 'real' impacts to migratory or nomadic bird species within Australian wind farms (Parsons & Battley 2013).

Currently, impact assessment of bird risks for wind farms is underpinned by educated assumptions made in the absence of extensive operational data; there is a low amount of Australian wind farm data and even less local data upon which to draw conclusions. To a degree however, wind farm collision risks are reversible. The Conroys Gap Stage 2 Wind Farm would operate under a bird and bat operational management plan, designed to identify consequences

that were not able to be anticipated. This is a Statement of Commitment of the proposal. These plans are adaptive and feedback mechanisms operate to ensure management is responsive to monitoring data. While this cannot prevent mortalities, it can identify trends and where required, shut down turbines in high risk windows, if required. Other likely management actions are prompt removal of stock carcasses near turbines and no lambing near turbines. Design measures also operate to reduce risks of collision; minimal lighting installed on turbines, for example.

Wind farm construction impacts are highly reversible. During decommissioning, all above ground infrastructure would be removed, restoring a large proportion of the original impact area.

4.4 Additional studies

Citations of literature or additional studies relevant to the affected species have been incorporated into the discussion of each species within Section 4.1.

Targeted surveys for the Golden Sun Moth were undertaken in November/December 2013 to determine if this species was present across the Yass Valley Wind Farm and Conroys Gap Stage 2 Wind Farm precincts. Surveys were undertaken by Blue Gum Ecological Surveys over a period of five days. Surveys were undertake at the Conroys Gap Stage 2 precinct on the 20 November at five locations. Four individual males were recorded at one location (between turbine 131 and 136). Across the Yass Valley Wind Farm precinct, the species was recorded at a range of altitudes and topographic areas including broad grassy valleys, low rolling grassy hills, mid slope areas and rock hill tops.

All Golden Sun Moths recorded were found inhabiting areas dominated or comprising a high proportion of Wallaby Grass. Not all areas containing such grasslands recorded this species though. A copy of the survey report for the Golden Sun Moth is located in Appendix H.

5 Proposed Avoidance, Management & Mitigation Strategies

The general approach taken to avoid, minimise and manage impacts is outlined below. All biodiversity mitigation measures that accompany the proposal to manage impacts relevant to EPBC matters, including an additional measure included after revised consideration in this review, are provided in Section 5.4.

5.1 Overview

5.1.1 Avoiding impacts

During early investigations of the proposal site vegetation type and condition were mapped within the entire development envelope[1], not just the development footprint (impact area). The biodiversity survey effort samples the development envelope. Constraints mapping is produced to identify high moderate and low constraint areas. This strategy provides flexibility for future changes in the layout, context regarding biodiversity impact assessment, and maximises avoidance of high conservation areas early in the layout design.

In order to minimise the potential impacts upon sensitive environments and species, an initial layout was assessed in relation to outcomes of the ecological field survey and constraints mapping. The initial layout resulted in a number of turbines and / or roads and cables being located within remnant native vegetation areas. From site surveys and aerial photo interpretation it was apparent that modifications could be made to the design to ensure that impacts to native species and habitat could be avoided and / or minimised. These important environments were considered in the reshaping process to provide the most sensitive environmental outcome possible, while still ensuring that the project was economically viable and socially responsible.

The current layout that is presented in this referral has continuously gone through an iterative process, with turbines locations being repositioned, deleted and in some cases added to areas previously thought unviable. The purpose of this process is to design a layout that efficiently harnesses the energy in the wind with minimal impacts to the existing environment (including ecology, heritage and land use productivity as well as visual and noise amenity for surrounding residents).

Along with the relocation or deletion of turbines, the associated access tracks were also modified. While the impact of an access track is far less than a turbine, every attempt was made to reroute access tracks away from native vegetation. In some cases, however, it was concluded that the impact caused in clearing a small area of vegetation on the top of the ridge would have a lower impact than relocating the track on the side of the slope where the overall impact of the cut and fill required to construct the track would have an impact over a much larger area.

Specific examples relating to the Conroys Gap Stage 2 precinct where avoidance has been applied by the proponent with relevance to EPBC listed matters include:

- Existing Yass Daisy colonies have been mapped and avoided and would not be impacted by the proposal.
- Box Gum Woodland CEEC in moderate to good and good condition classes have been mapped and infrastructure specifically located to avoid woodland. The location of an access track, cable route affects a small area of good condition Box Gum Woodland Derived Grassland CEEC, but the alignment has been sited to affect the smallest area possible.
- Common woodland remnants to the west of the project site have been avoided with turbines and other infrastructure primarily sited in exotic pasture.

[1] The development envelope is the broad area within which infrastructure could potentially be located.

This list is not exhaustive. Additional avoidance requirements are spelled out in the Marilba Biodiversity Assessment (2009a) and Supplementary Ecology Report (2012).

5.1.2 Managing impacts

A key characteristic of wind farm development that has bearing on the biodiversity survey and impact assessment approach is the uncertainty regarding the final infrastructure footprint. The infrastructure layout is refined and alignments moved several times from the commencement of the project, to reflect constraints (such as biodiversity), maximise wind yield, incorporate land owner changes, and increasing site knowledge that may influence civil infrastructure placement. Therefore, biodiversity survey coverage cannot be restricted to a specific infrastructure layout. The 'development envelope' survey strategy explained above is a response to this.

The movement of turbines and other infrastructure within the development envelope is termed 'micro-siting'. Limits are placed on micro-siting by the draft standard conditions for wind farms developed by the NSW Department of Planning and Infrastructure (a location allowance of 100 metres radius for development components as long as impacts remain consistent with that assessed - http://www.planning.nsw.gov.au/standard-and-model-conditions). Where uncertainty exists with regard to impacts, and as a further opportunity to minimise and manage impacts, we regularly recommend that micro-siting be undertaken with input from an ecologist. Examples in this management strategy with relevance to EPBC matters include:

- Golden Sun Moth construction management plan – undertake further surveys to verify the extent of Golden Sun Moth habitat within the development footprint. Micrositing of tracks and power lines would be undertaken where practical. Offsetting in areas of known habitat would be undertaken.
- To assist to minimise impacts on Box Gum Woodland Derived Grassland CEEC, the one area of CEEC that cannot be entirely avoided by infrastructure (underground cable route and access track only).

Furthermore, offsetting is proposed to account for residual impacts that cannot be avoided or suitably minimised. This is set out in detail in Section 6.

5.2 Proposed construction exclusion zones and buffers zones and areas will be avoided or protected

An environmental constraint, for the purposes of the biodiversity assessment, is an environmental condition that reduces the capability of a site to accommodate a specific development. The constraint class maps provide a simple visual representation of areas key biodiversity values which may be impacted by the proposal. The maps also allow for the selection of alternative less constrained sites for development works.

Constraints maps sets within the Marilba Hills Precinct Biodiversity Assessment and Supplementary Ecology Report (SER) together provide a complete set of maps to guide the development of the wind farm with regard to biodiversity constraints.

- High constraints, all high constraints areas would be avoided (there are small exceptions to this which have been deemed non-significant)
- Moderate constraints, impacts would be strictly minimised in all moderate constraint areas
- Low constraints, infrastructure should be preferentially located in these areas.

The high constraint areas can be viewed as exclusion zones. The maps sets are expected to be a key component of the Biodiversity Management Plan that would be prepared to guide construction, ensuring that any future infrastructure micro-siting is not in contravention of the conclusions of the assessment undertaken for the project.

Additionally,

- Buffers would apply to mature hollow-bearing trees to ensure indirect impacts (such as noise and dust) are minimised where practical. An appropriate buffer width would be twice the tree drip line, for example. This is included as a mitigation measure.

5.3 How turbines have been sited to minimise risk to threatened birds

Considering the affected species identified in Section 3, risks to threatened birds posed by this development occur in the construction and operational stages:

Table 5-1 Threatened bird risks

Affected species	*Construction risk*	*Operational risk*
Superb Parrot	Loss of foraging and breeding habitat	Collision
Swift Parrot	Loss of foraging habitat	Collision
Regent Honeyeater	Loss of foraging habitat	Collision

The level of risk is characterised for these species in Section 4. Measures that have been taken to avoid or minimise these risks include:

5.3.1 Avoid

Construction impacts are addressed by avoidance of important habitat resources for these species. These equate to high constraint areas, as discussed above. For these affected species, areas/features include:

- Box Gum Woodland in moderate to good and good condition classes (The location of an access track, cable route affects a small area of good condition Box Gum Woodland Derived Grassland CEEC, but the alignment has been sited to affect the smallest area possible).

This list is not exhaustive. Additional avoidance requirements are spelled out in the Marilba Hills Precinct Biodiversity Assessment and Supplementary Ecology Report.

5.3.2 Minimise or manage

Measures to minimise impacts during the design, construction and operational phase of the wind farm proposal are highlighted in Table 5-2. Measures to minimise impacts were developed to ensure potential impacts are minimised at: 1) a broad level in which general management or control measures can be applied to the entire proposal; or 2) at a defined level in which management or control measures can be applied to particular areas, individual species, faunal groups, or a vegetation type.

In particular, collision risks for threatened birds are addressed in the design stage, by eliminating features known to increase collision risk. The following list is summarised from the Marilba Biodiversity Assessment:

- Marker lights, if required should be minimised in number and fitted to reduce their ability to attract migrating birds and insects. Red lights are preferred, with the least number of flashes per minute. Cowls may also shield the light when viewed from the ground and reduce potential to attract wetland birds taking off at dusk. It is understood that CASA requirements will prevail. An aviation assessment has confirmed that obstacle lighting will not be required for the wind farm.
- Guy lines should not be fitted to towers or associated structures, where possible.
- The turbine towers should not provide perching opportunities.
- Electrical connection lines should be installed underground where possible.

In the operational stage, risks are managed by monitoring actual collision impacts and taking actions where required to address these. The Conroys Gap Stage 2 Wind Farm would operate under a bird and bat operational management plan. The plan would be adaptive and feedback mechanisms would operate to ensure management is responsive to monitoring data. While this cannot prevent mortalities, it can identify trends and where required, shut down turbines in high risk windows, if required.

5.4 Description of mitigation measures prescribed to address indirect impacts to matters of NES (on- and off-site)

Table 5-2 documents the prescribed management measures committed to by the proponent to avoid, minimise and offset impact to the affected species.

Table 5-2 Management measures to avoid, minimise, or offset impacts of the proposal.

Note these measures represent those measures that relate specifically or broadly to the affected species. They have been drawn from the Marilba BA and the SER. Additionally, a new measure has been added to properly address risks to the Golden Sun Moth.

ID	Target Species/Community	Objective	Avoid, Minimise, Offset	Mitigation Tasks	Project Phase	Auditing2
SPECIFIC MEASURES						
1	All species / communities	Ensure all infrastructure will be sited entirely within the areas assessed in the Biodiversity Assessment.	Avoid, minimise, offset	All infrastructure would be sited entirely within the development envelope assessed in the Biodiversity Assessments. Where this is not possible, additional assessment would be undertaken and the appropriate approval would be sought (i.e. variation to Conditions of Approval).	Detailed design of infrastructure layout	CEMP
2	All species / communities	Avoid significant impact to high value biodiversity area	Avoid	All infrastructure would be sited to avoid high constraint areas (including high constraint habitat features) and minimise impacts in moderate constraint areas.	Detailed design of infrastructure layout	CEMP
3	Hollow-bearing Trees	To ensure core breeding habitat for hollow-dependent species is not adversely affected by the proposal (i.e. Superb Parrots and Swift Parrots).	Avoid, minimise, offset	Infrastructure micro-sited to avoid hollow-bearing trees, where possible. These are identified as a high constraint (avoid). Ideally, construction and any required tree clearance should avoid the peak breeding time for fauna and nesting time for birds (e.g. spring-summer). For hollow-bearing trees to be cleared a management plan should be prepared by an ecologist detailing: procedures to minimise impacts to, and relocate resident fauna; timing of works to avoid breeding periods; number and type of hollow-bearing trees to be removed and offset (to be included in Flora & Fauna Management Plan). Where hollow-bearing trees are to be cleared a standard pre-clearance survey, such as that described in *Biodiversity Guidelines* (**ngh**environmental / RTA 2011), should be undertaken and details of hollow-bearing trees cleared including number and size of hollows and number of hollow-bearing trees recorded.	Detailed design of infrastructure layout	CEMP
4	Superb Parrot, Swift Parrot	To minimise habitat loss for the Superb Parrot and Swift Parrot.	Avoid, minimise, offset	Where hollow-bearing trees cannot be avoided, nest boxes would be installed to replace this resource. This is stipulated in the offset strategy. This measure is considered supplementary to offsets that would also take into account the removal of hollows. Approach routes to the subject site should be selected to minimise the need to clear or trim remnant eucalypts along local roads such as Grace's Flat Road, since most of this vegetation falls within the Box-Gum Woodland EEC definition and is likely to be significant for threatened fauna species such as Superb Parrot. Contractors and staff would be made aware of the potential risk of vehicle collision to the threatened Superb Parrot feeding on spilt grain beside local roads	Detailed design of infrastructure layout	CEMP
5	Box Gum Woodland CEEC	Prevent unauthorised clearance. Minimise clearing as much as possible to reduce track and powerline impacts.	Avoid, minimise	Clearly demarcate works areas nearby or within Box Gum Woodland areas (Appendix E) to strictly define permitted clearance zone. Remnant CEEC would be protected from peripheral and indirect impacts and would not be used for site access or materials/equipment laydown. Minimise track width to the minimum required for safe access and operation. Tracks and powerline works would be micro-sited with the advice of an ecologist. Removal of topsoil and subsoil for trenching to be replaced and revegetate disturbed areas with local native grasses (i.e. Kangaroo Grass, Wallaby Grass or Spear Grass). A buffer twice the distance of the tree drip-line would be established in sensitive areas identified in the Biodiversity Assessment constraint map set to ensure indirect impacts (such as compaction, noise and dust) are minimised where practical.	Detailed design of infrastructure layout	CEMP
6	Yass Daisy	Avoid impact to known populations.	Avoid	Works should be sited outside known Yass Daisy population areas (Appendix F). The Yass Daisy population would be identified and protected during the construction and operation phases. Special rehabilitation measures would be used for works in the vicinity of any populations, including topsoil removal, storage and replacement, whole sod removal and replacement if practicable and effective weed control at all stages. Exposed areas along the trench line would be revegetated with local native grasses (*Microlaena stipoides* and/or *Themeda triandra*). The proposed cable route between the Marilba substation and Conroys Gap Stage 2 would be located to avoid direct or indirect impacts to all recorded plants and colonies, with a minimum 2 m buffer. If trenching is used at the Conroys Gap Stage 2 site, the works would temporarily disturb around 340 m^2 of potential habitat (but no individual plants). Special protection and restoration measures would apply. If overhead cabling is used, the potential habitat area would not be impacted.	Detailed design of infrastructure layout	CEMP
7	Golden Sun Moth (GSM)	Avoid impact to known populations.	Minimise and offset	Preliminary surveys have indicated the species occurs within the Conroys Gap Stage 2 precinct. Preconstruction surveys of	Detailed design of	CEMP

[2] The Construction and Operation Environmental Management Plans (CEMP and OEMP) are documents submitted to Dept. Planning prior to construction and operation. Incorporation of these commitments within these management plans allows each commitment to be auditable.

ID	Target Species/Community	Objective	Avoid, Minimise, Offset	Mitigation Tasks	Project Phase	Auditing2
				the final infrastructure layout would be completed in accordance with the relevant survey guidelines (Significant Impact Guidelines for the critically endangered Golden Sun Moth *Synemon plana;* DEWHA 2009a) for this species. The results of these surveys would be used to minimise impacts and ensure offsetting requirements, where avoidance is not possible. The management protocols for this species would be documented within a management plan, to be implemented as part of the construction process.	infrastructure layout	
GENERAL MEASURES						
8	All species and vegetation communities	Weed management	Avoid	Control noxious weeds in works area according to plans and control measures of the Local Government Authorities Minimise use and adhere to best practice guidelines for herbicide treatment in environmentally sensitive areas (i.e. Box Gum Woodland) Establish hygiene plan to ensure vehicle and machinery is absent of organic matter pre- and post-site access Sign environmentally sensitive areas (i.e. CEEC areas) and designate clean-down area for entry / exit points into these areas. Monitoring and weed control in areas of known noxious or invasive species. Understorey vegetation in easements should be managed to maintain composition and quality to prevent weed invasion	Construction	CEMP
9	All species and vegetation communities	Pollution prevention	Avoid	Establish a spill plan to prevent chemicals or pollutants from having an adverse effect on the environment. Backfill cable trench where cement is used; at least 20 cm of cement free topsoil to be replaced as the top layer in the back fill. Establish an erosion and sediment control plan so appropriate controls are in place prior to commencement of works.	Construction	CEMP
10	All species and vegetation communities	Site management	Avoid	Lightly mulch exposed soils with chipped vegetation or sterile hay in areas dominated by exotic groundcover species. Sow with an appropriate cover crop in consultation with land owners. Lightly mulch exposed soils with chipped vegetation or sterile hay in areas dominated by native grasses using local provenance species. Fertiliser should not be used to promote revegetation in areas dominated by native grasses.	Construction	CEMP
11	All species and vegetation communities	Site inductions to avoid unauthorised impact	Avoid	Contractors and staff would be made aware of the significance and sensitivity of the constraints identified in the Biodiversity Assessment constraint map set for each precinct during the site induction process.	Construction	CEMP
12	Habitat features including reptile habitats for Pink-tailed Worm-lizard and Striped Legless Lizard	Habitat management	Minimise	Clusters of rocks and boulders should be avoided where possible. Where rocks and boulders cannot be avoided, they should be placed directly adjacent to the works area to preserve the availability of refuge. Where rocks are to be removed, pre-clearance for threatened reptiles should be undertaken by experienced personnel (refer point 15). Standing dead trees, stumps and woody debris should be avoided where possible. Where they require removal to allow for the tracks and hardstand areas, they should be placed adjacent to the impact areas, to retain these refugia in the immediate area.	Construction	CEMP
13	Water sources	Habitat management	Minimise	Should dams be required to be removed during site development, alternative watering points would be established to compensate for their loss, where practical and with the agreement of the landowner.	Construction	CEMP
14	All species and vegetation communities	Offset Plan Development of an offset plan to offset impacts to maintain or improve biodiversity in the longer term	Offset	The Proponent would commit to preparing and implementing 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 proposal. Offset areas would reflect the actual footprint of the development (i.e. footing areas and new tracks) not the maximum impact areas. The Offset Plan would be prepared in consultation with OEH, prior to construction.	Prior to construction	CEMP
15	All species and vegetation communities	Biodiversity Management Plan To avoid significant impact to flora and fauna outside of the accepted clearance boundaries and prevent 'unassessed' impacts occurring.	Minimise	A Biodiversity Management Plan would be prepared within the CEMP to document the implementation of biodiversity measures, sourcing the Biodiversity Assessments prepared for each precinct for area specific measures. This would include construction and operational activities. The management plan should highlight ecological important areas (vegetation communities and threatened fauna species habitat) and their management. Detail pre-construction survey work which would be used to microsite infrastructure, where practical, and offset impacts, where they cannot be avoided. The target species include Striped Legless Lizard and hollow-bearing trees. A final site inspection should be carried out after road and electricity easements are finalised, to ensure that threatened species habitat and high constraint EEC vegetation has been avoided or that impacts are manageable.	Prior to construction	CEMP

ID	Target Species/Community	Objective	Avoid, Minimise, Offset	Mitigation Tasks	Project Phase	Auditing2
16	High risk bird and bat species, particularly threatened species (including Swift Parrot, Superb Parrot, Regent Honeyeater and migratory species)	Bird and Bat Monitoring Program. Development of an 'insurance' monitoring program to address uncertainty inherent in the assessment.	Minimise, offset	An adaptive Bird and Bat Monitoring Program would be developed prior to construction and would include the collection of baseline (pre-operation) as well as operational monitoring data.	Prior to construction	CEMP, OEMP
17	All species and vegetation communities	To avoid significant impact to flora and fauna outside of the accepted clearance boundaries and prevent 'unassessed' impacts occurring.	Avoid, minimise	A flora and fauna assessment would be undertaken prior to decommissioning to identify biodiversity constraints and develop specific impact mitigation measures.	Decommissioning	OEMP

6 Proposed Offsets

6.1 Proposed offset, protection and management

6.1.1 Introduction

Offsets are required for this development to achieve the overall 'maintain or improve' outcome required of Part 3A developments, assessed under the *NSW Environment Planning and Assessment Act 1979*. The commitment to offset has been outlined in a strategy document (Appendix H of the Supplementary Ecology Report – Yass Valley Wind Farm; **ngh**environmental 2012) to provide certainty around how offsets will be identified, secured and managed, rather than defining an offset site at the pre-approval stage. An update of the offset strategy document is attached to this report (Appendix G) and referenced in the sections below to provide the information requested by DoE.

It is noted that the final offset package would be prepared in consultation with the NSW Office of Environment and Heritage (OEH) and Catchment Management Authority (CMA) and final offset ratios may vary slightly, however the strategy demonstrates that offsets are feasible for this project.

6.1.2 How will offsets be calculated

Appendix H of the SER sets out key components of the offset methodology including the calculation of areas to be impacted, the determination of suitable offset ratios and how the final offset site will be selected.

Calculating the areas to be impacted (areas requiring offsets)

As part of the biodiversity assessment, the impact area for the proposal has been estimated to both assess the impacts of the habitat loss and habitat modification associated with construction, but also to inform the commitment to offset the impacts of clearing. The proponent commits to offset all permanent habitat loss as a result of the construction of the wind farm. Permanent habitat loss includes all footings and tracks as well as easements where they occur in treed areas.

This area has been estimated for the proposal (Appendix F of the SER) however, as the proponent commits to offset *actual* not *estimated* impacts, the proponent also commits to a post-construction audit of vegetation impact prior to finalising the boundaries of the offset site. In this way, there is a mechanism to ensure the *actual* amount of clearing is offset and a further incentive throughout construction to minimise impacts wherever possible, thereby reducing the offset requirement for the proposal.

Determining a suitable offset ratio

Using the information currently available for the site and additional survey data that will be collected (for example, in preclearance surveys specified in the project's Statements of Commitment), the proponent commits to determining an offset ratio with reference to:

- The conservation status of the vegetation
- The condition of the vegetation
- Whether the habitat provides (*actual*, not *potential*) threatened species habitat

The proposed ratios below have been developed based on experience with the NSW Biobanking Assessment Methodology. They are a simplification of that methodology but have the benefit of being transparent to the proponent and the consent authority. Hollow-bearing tree (HBT) offset requirements are supplementary to area offsets; for each HBT removed, a nest box would be installed.

Table 6-1 Proposed offset ratios for native vegetation to be permanently removed

Condition class	*Proposed offset ration based on conservation status of habitat*			
(as presented in the SER 2012)	*Vegetation NOT OF conservation significance*	*Vegetation OF conservation significance*[3]	*Threatened species habitat*	*HBT removed: nest box*
Poor	1 : 1	1 : 2	1 : 2	1 : 1
Poor-moderate	1 : 1	1 : 2	1 : 2	1 : 1
Moderate	1 : 1	1 : 5	1 : 5	1 : 1
Moderate-good	1 : 1	1 : 10	1 : 10	1 : 1
Good	1 : 1	1 : 10	1 : 10	1 : 1

Specific offset outcomes for EPBC affected species are set out below, in *How will the offset compensate for the impacts on affected species.*

6.1.3 When will the offsets be implemented and delivered

For several reasons, the commitment to offset has been proposed as a strategy document which outlines and provides certainty around how offsets will be identified, secured and managed rather than defining a site at the pre-approval stage. These reasons primarily relate to timing; the length of time to obtain a wind farm approval and the length of time once approved, between completion of detailed design, commencement of construction and operation can be several years. The final infrastructure layout affects the areas of clearing and the landholders involved, which in turn will affect the final makeup of the offset site. Threatened entity listings and condition of vegetation may change over this time.

As it is important to ensure that the final area to be offset reflects the actual, not estimated, area of clearing, to address the timing delays, the offset strategy sets out a criteria which must be met by the offset site (above) and specifies that a post-construction audit of vegetation impact is required before the boundaries of the offset site are finalised. In this way, there is a mechanism to ensure the actual amount of clearing is offset and further, there is an incentive throughout construction to minimise impact areas, reducing the offset requirement for the proposal and minimising the overall environmental impact of the development. While securing and defining an offset site at the pre-approval stage would provide the appearance of certainty, it would not reflect the reality of wind farm development and would not guarantee that the actual areas impacted would be offset.

The implementation sequence would be:

Pre-approval	1. Offset strategy developed: criteria to define the offset site, demonstration that the offset is achievable and feasible.
Pre-construction	2. Offset planning fully developed with input from relevant agencies as part of pre-construction environmental management documentation, for submission to the consent authority.
Pre-operation	3. Actual offset boundaries defined and attached to land titles prior to the operation of the wind farm, reflecting the actual impact areas of construction.
Ongoing	4. Management actions commence as soon as the boundaries are established and will remain in perpetuity.

Management and security of the offset site is discussed further below in *How will the offsets be managed and secured.*

[3] Endangered ecological communities listed either under the NSW TSC or EPBC Act.

6.1.4 Where will the offsets be defined

Because of the agreements with landholders to lease the properties for the life of the wind farm (25-30 years minimum), the preferred approach with regard to offsetting is to include as part of the agreements with landholders, securing offset land within the site boundaries. The broad vegetation type mapping undertaken as part of the Biodiversity Assessments provides certainty that the type of vegetation that will be cleared, occurs in sufficient quantity to offset the impacts of clearing.

The table below summarises some of the reasons why identifying the offsets from within the site boundaries would result in achievable offsets.

Table 6-2 Benefits of offsetting within the site boundaries

Development (impact areas) characteristics	*Result for offset site*
The wind farm impact area is a small proportion of the site boundaries. Broad vegetation type mapping is available for the larger site.	*Ample residual area in each vegetation type to be considered as offsets (ample ratios demonstrated as able to be achieved for each vegetation type that will be impacted).*
The wind farm impact areas are generally of lesser habitat quality when compared to the vegetation retained within the site boundaries. This is achieved through early constraints mapping to inform the site layout and Statements of Commitment to avoid, wherever possible, areas of high constraint.	*Land in the locality of higher biodiversity value able to be identified and protected.*
The land on which the wind farm is constructed will be owned by the same persons who will own the offset sites.	*Offset agreements can be a part of lease agreements, included in landowner negotiations.*
Large parcels of land that share property boundaries.	*Coordinated management.* *Potential to reduce edge area effect by linking sites on neighbouring properties.*

The offsets will be defined from within the involved land holder boundaries (the project site boundaries).

The agreements with the landholders provide certainty that the areas can be managed appropriately, including the establishment of a vehicle to protect the areas in perpetuity. The wording in landholder contracts for this development is as follows:

> ***Biodiversity offset.*** *If requested by the Wind Farm Company, the Landowner agrees to negotiate in good faith to set aside part of the Land (or nearby land owned by the Landowner) for the purpose of providing appropriate biodiversity offsets in relation to the Wind Farm, including, if appropriate, the registration of a covenant regarding future use and management of that part of the land. The Wind Farm Company shall pay reasonable compensation and the reasonable costs of the Landowner in negotiating and establishing the biodiversity offset.*

6.1.5 How will the offsets be managed and secured

It is proposed that the wind farm operator would be responsible for the management of the offset site, during the operational life of the wind farm. The operator is likely to finance the landowner of the site to undertake management actions (such as fencing and weed control) but would retain responsibility for the management of the site. This provides surety that the actions will be undertaken, as the requirement to offset would be a condition of the wind farm operator's project consent.

At the decommissioning stage, the ongoing management would be the responsibility of the landowner. It is expected that by this time the majority of the required management actions would have been undertaken and ongoing management tasks will largely coincide with routine agricultural activities. Land use restrictions will remain in place on the offset site so that any activities undertaken on the offset site must be compatible with the site's overall function: to improve biodiversity values.

The proponent commits to securing a formal vehicle to manage the offset site in perpetuity. A Conservation Property Vegetation Plan (CPVP) is proposed, attached to the land title under the NSW *Native Vegetation Act 2003*. The

agreement will specify management actions and restrictions on land use, in accordance with the finalised offset plan for the site and will operate in perpetuity.

6.1.6 How will the offset compensate for the impacts on affected species

The offset land will be set aside and managed in perpetuity for conservation purposes. The long-term improvement in the offset site and its contribution to local landscape connectivity will compensate for the loss of smaller areas of habitat of generally lesser biodiversity value.

Considering affected EPBC listed species, the following offsets ratios have been proposed with reference to Appendix G.

Table 6-3 Offsets for affected species

Affected species	*Condition of vegetation, where relevant (5 class condition categorisation)*	*Ratio from Offset Strategy*
Box Gum Woodland	M-G	*1:10*
	G	*1:10*
Yass Daisy		*1:10*
Golden Sun Moth		*1:10*
Superb Parrot	P, P-M	*1:2*
	M	*1:5*
	M-G	*1:10*
	G	*1:10*
Swift Parrot	P, P-M	*1:2*
	M	*1:5*
	M-G	*1:10*
	G	*1:10*
Regent Honeyeater	P, P-M	*1:2*
	M	*1:5*
	M-G	*1:10*
	G	*1:10*
Hollow bearing trees		*1:10*

Condition classes include poor, poor-moderate, moderate, moderate to good and good.

Notes:

- The Yass Daisy impact area can be confidently stated as 0 ha, because targeted surveys have informed micro-siting of infrastructure to avoid all individuals so far detected.
- The site contains breeding and foraging habitat for the Superb Parrot. Impact areas would be estimated by declaring all Box Gum Woodland as potential habitat.
- The Swift Parrot is considered, based on the results of surveys to date, not to reliably utilise the site. If detected during future surveys, prior to construction, this species would be offset however, available information suggests that no offset will be required for this species.
- The site contains foraging habitat for the Regent Honeyeater. Impact areas would be estimated by declaring all Box Gum Woodland as potential habitat
- HBT offsets are supplementary. That is, for each HBT removed, a nest box (or remounted hollow) would be installed. This may occur on offset or other land within the site boundaries. HBTs are high constraints in the

Coppabella and Marilba precincts (avoid) and moderate in the new areas (minimise); micro-siting will be undertaken to minimise the number requiring removal and therefore offsetting.

6.1.7 How will the offset will ensure protection, conservation and management for affected species

A Conservation Property Vegetation Plan is proposed, attached to the land title under the NSW *Native Vegetation Act 2003*. The agreement will specify management actions and restrictions on land use, in accordance with the finalised offset plan for the site and will operate in perpetuity.

A CPVP is a legally binding agreement under both the NSW *Native Vegetation Act 2003* and the NSW *Threatened Species Conservation Act 1995*. The terms of the CPVP will not be affected by any changes to local or state planning rules or new listings of threatened species. A CPVP can be varied at the landholder's request, provided the variation will still improve or maintain environmental outcomes.

The long-term improvement in the offset site and its contribution to local landscape connectivity will compensate for the loss of smaller areas of habitat of generally lesser biodiversity value.

6.2 Commonwealth (EPBC) offset policies

6.2.1 Offset calculations

The EPBC Act Environmental Offsets Policy (EOP) outlines the Australian Government's approach to the use of environmental offsets ('offsets') under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This policy relates to all matters protected under the EPBC Act. Offsets are required where a significant impact is anticipated. For the proposed Conroys Gap Wind Farm, this could include:

- Golden Sun Moth

While further surveys are required to determine the extent of impact to this species, given the impact types and their distribution, in discrete patches across a very broad project area, impacts are considered well able to be minimised and residual areas offset, sufficient to meet the EOP requirements.

Methods

The Offsets Assessment Guide (OAG) was run according to the information contained in the document titled 'How to use the Offsets Assessment Guide' (which is published on the DSEWPaC's EPBC Act environmental offsets policy web page). In running the OAG, the user is required to enter a number of variables which require a quantitative assessment of the condition of the vegetation at the development and offset site and also factors such as the time until the ecological benefit of the offset is realised, the risk of the loss of the offset and the level of confidence in these results. The reasoning used in reaching these values is discussed individually for each below.

Area of habitat – Starting with the surveyed areas that we have now extrapolated to moderate and high potential habitat (12.56 hectares for the Conroys site), we have overlaid the infrastructure footprint to estimate moderate and high potential habitat that would be removed by the proposal. The total area of impact is 0.806 ha. The residual area available for use as offset lands is 11.754 ha.

It is noted that, given the broad habitat preference of the species in this location, approximately 291 hectares of potential habitat occurs within the Conroys Gap site boundaries can could therefore be considered for offsetting (box gum woodland derived pasture in any condition, poor to good).

Quality of habitat

The overall habitat quality score (0-10) was determined by considering the following factors (as outlined in the 'How to use the Offsets Assessment Guide') individually:

- Site condition. Including vegetation condition (weediness), structure and species diversity.
- Site context. The biodiversity importance of the site in terms of its landscape position.
- Species stocking rate. The number of individual populations at the site.

The contribution of these factors was then weighted according to their level of importance to achieve an overall habitat quality score. The results of this analysis are provided in the table below. As the offset site is immediately adjacent to the area to be impacted, the start quality of both areas was considered to be the same.

Table 6-4 Habitat quality score

Factor	Score	Importance Ranking	Reasoning
Site condition	5	1	Habitat for GSM at the site carries a large proportion of exotic species including listed noxious weeds. Species diversity is generally very low. However, this species can tolerate weediness.
Site context	5	2	The site occurs in a highly modified and fragmented environment. The habitat at the site is not considered greatly important with regard to connectivity or for the persistence of the habitat within the landscape which provides similar vegetation and habitat values.
Species stocking rate	5	3	The species is known across this site and in numbers on adjacent sites (Yass Valley, Bango, Rye Park localities). Numbers varied from 1 to 50 individuals on the Yass Valley site to the north. Numbers were less than ten at all survey sites on Conroys Gap. The population at the site is not considered the local stronghold for the species, based on this data
Overall habitat quality score = 5			

Time over which loss is averted for the offset

As the offset site is to be legally secured and managed in perpetuity under a Conservation Property Vegetation Plan pursuant to the Native Vegetation Act 2003, the maximum forecast term of 20 years was selected for this variable.

Future quality with or without offset and time until ecological benefit

The values for these variables are largely based on the management actions proposed as part of the offset plan including:

- Exclusion of stock
- Weed control
- Rabbit control

It is considered reasonable that the overall quality of the habitat within the offset site could be increased to a value of 7 over a period of 10 years by maintaining these management actions. Conversely, if current land management practices continue, it is considered likely that the site would further degrade in quality eventually becoming so poor as to not represent habitat suitable for the GSM. Over the 10 year period it is considered likely that the overall habitat quality would degrade to a value of 2.

As the degradation at the site has been largely caused by weed invasion and over grazing and that the management actions described above would be required to be carried out as part of the project's consent, a confidence level of 80% has been applied. This is considered reasonable as it still allows for unforeseen circumstances such as extreme weather events.

Risk of loss of the offset site with or without the offset

The offset sites under consideration are currently utilised for grazing and is situated within a landscape where this is the dominant land use. The land is zoned 1(a) General Rural. The land is privately owned and not protected by any conservation agreements or reservation schemes. There are no known pending mining leases or development applications that apply to the offset site. As stated in the 'How to use the Offsets Assessment Guide', degradation to the quality of the site due to current management practices and use should not be incorporated into the risk of loss as these factors are incorporated in the quality score however, it is considered reasonable that future land management practices be taken into account. These may include broad scale spraying and cropping. An estimate of 50% risk of loss without offset has been applied as the site is unprotected and the future intentions of the landowner are unknown.

With the offset in place, the risk of loss is considered to be very low as the offset would be legally secured in perpetuity. There is a small chance that the offset may be lost due to unforeseen circumstances. A 5% risk of loss has been applied to account for this.

The estimated values for risk of loss are based on factors outside the control of the proponent but are considered reasonable, given the known land use history. An 80% confidence in these results has been applied.

Results

Utilising the values described above, the OAG returned a ~700% direct offset for the impact. While additional survey is required to inform impact areas and offsets, this result shows that an offset for this species would be highly feasible. No additional compensatory measures are considered to be required.

Moving forward, the project commitment is to undertake targeted surveys in November-December 2014 to conclusively map the distribution of the species, to allow an accurate quantification of impact and therefore offset requirement to be determined, if required. The results to date indicate that offsetting impact will be feasible.

6.2.2 Offset policy

To satisfy the EPBC Act EOP suitable offsets must:

1. ***deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action***

   The offset areas would be subject to in perpetuity management for biodiversity outcomes. Management would be specific to the values of the offset site and including monitoring and hence ensure the viability of habitat quality and persistence.

2. ***be built around direct offsets but may include other compensatory measures***

   As a 100% direct offset has been achieved, no other compensatory measures are considered to be required.

3. ***be in proportion to the level of statutory protection that applies to the protected matter***

   This has been taken into account by entering the status of the GSM into the offset calculations.

4. ***be of a size and scale proportionate to the residual impacts on the protected matter***

   Direct impacts include habitat loss and mortality where habitat coincides with the infrastructure footprint. The estimated habitat loss, based on current survey data, has been entered in the offset calculator.

5. ***effectively account for and manage the risks of the offset not succeeding***

   The direct offset will be managed in perpetuity for biodiversity under a legally binding agreement which provides surety of the offset succeeding for the long-term.

6. ***be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)***

   The offset site includes land that is currently private grazing land, not protected by any other conservation or zoning measure

7. ***be efficient, effective, timely, transparent, scientifically robust and reasonable***

   An Offset Plan would be prepared in consultation with NSW OEH, and local Councils and Catchment Management Authorities. This offset plan would provide efficiencies by also satisfying the requirements of the EPBC EOP.

   Satisfying the plan and management requirements pertaining to the offset would be a condition of the project's consent and in this manner, transparent and timely.

8. ***have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.***

A CPVP will be prepared and implemented to secure and manage the direct offset. This ensures that the site is protected in perpetuity and that restrictions on land use that apply will be attached to the title, as will management measures.

During the operational life of the wind farm (expected to be around 30 years), the management and maintenance of the offset site will be auditable through the project's Operational Environmental Management Plan as the offset is part of the consent conditions of the approved project.

Summary

This information demonstrates that suitable offsets are feasible for the project. Moving forward, the project commitment is to undertake targeted surveys in November-December 2014 to conclusively map the distribution of the Golden Sun Moth, to allow an accurate quantification of impact and therefore offset requirement to be determined, if required.

6.2.3 What is the anticipated cost of delivery of the offset

Costs associated with the offset area are as follows:

- **Purchase of land.**

As the land is currently owned by involved land holders, no exchange of title or purchase of land is foreseen.

- **Lease of land**

Lease payments are made to the landowners throughout the operational life of the wind farm by the proponent, commensurate with the number of turbines located on each property. Additional payments to compensate for lost income on offset land would also be made by the proponent to land owners, where applicable.

- **Management actions during the operation of the wind farm**

The bulk of the management costs are expected to be incurred at the establishment of the offset site. This would include fencing, signage, weed control, pest animal control and installation of nest boxes, where required. These costs would be solely borne by the proponent.

- **Management actions after the decommissioning of the wind farm**

It is possible that the landowner would be provided some upfront payment by the proponent, in consideration of any obligations after decommissioning of the wind farm. Strictly speaking, these costs would be borne by the land owner and are expected to amount to routine agricultural maintenance of fencing, weed control and pest animal control. Managed grazing, with care to retain set biomass levels, is expected to be permitted, providing some income for the management of this land.

6.2.4 Conclusion

The Offset Strategy developed as part of this project application sets out a methodology to calculate, manage and secure an offset site to offset the impacts of the construction of the proposed Conroys Gap Stage 2 Wind Farm. A site has yet to be identified, but there is ample land of suitable type within the project boundaries to demonstrate that offsets are achievable for EPBC affected species, where they are demonstrated to occur. Further, the plan provides clear incentives, in the form of pre-set ratios that relate to existing mapping, for the proponent to further minimise impacts and thereby reduce the offset requirement for the proposal.

7 Social & Economic Impacts

7.1 Existing environment

The proposed Conroys Gap Stage 2 Wind Farm would be located primarily within the Yass Valley Local Government Area (LGA).

Key statistics pertaining to the Yass Valley LGA are provided in Table 7-1 and Table 7-2 (ABS, 2011).

Table 7-1 Key statistics for the LGA

	Yass Valley (2011)
Size of shire: Area of sq. km.	3,997
Population	
Number	15,516
% Growth since 2007	10%
Medium age (yrs.)	39.8
Average Total Income (excl. pensions) (2010)	$50,239

Source: Australian Bureau of statistics

Table 7-2 Top 10 industries by % employed (2011)

Yass Valley	
Public administration and safety	19.1
Construction	10.2
Health care and social assistance	8.6
Agriculture, forestry and fishing	8.2
Professional, scientific and technical Services	8.2
Education and training	8.1
Retail trade	7.9
Accommodation and food services	6.5
Other services	3.1
Manufacturing	3

The Yass Valley Shire is largely agricultural. Extensive grazing of sheep and cattle are the predominant land uses. In recent years many new agricultural industries are emerging including cool climate wines, alpaca studs, miniature cattle studs, olives and berries (Yass, 2013). The major industry sectors within the Yass Valley Shire are agriculture, retail trade and tourism, which reflect the predominately rural nature of the area. Bowning is the closest village to the project and provide limited services (cafe, accommodation). Yass, the major centre of the Yass Valley LGA is located approximately 17 kilometres east of the project and has a population of approximately 6,000 residents. The Yass Valley LGA features historic buildings, wineries, rural villages, antiques and art galleries along with Burrinjuck Water State Park valued by locals and visitors alike.

7.2 Impact Assessment- Construction and Decommissioning

The project would provide temporary employment opportunities during construction and decommissioning. The increased demand for services in the local area, most likely during the construction phase, would also accompany the development, as contractors seek to accommodate and utilise other services in the local area. While it is hard to

predict the exact amount of investment that will be injected into the local economy, there have been studies conducted to calculate the likely impacts based on the size of a proposed wind farm. The Clean Energy Council commissioned Sinclair Knight Merz (SKM) to prepare a report into the investment costs and benefits of wind farms in Australia. SKM released the report '*Wind Farm Investment, Employment and Carbon Abatement in Australia*' in June 2012 which presents an updated national and state-based snapshot of wind farm investment, jobs and carbon abatement. The study aimed to use financial and other data from a range of sources to provide a reasonable set of indicative figures to estimate the financial inputs and outputs for wind farms on a per MW basis (SKM, 2012).

Construction

SKM reviewed data based on the expenditure per MW of a number of wind farms that were recently developed or under construction. It found that this review closely reflected the expenditure data from Hallett 1, Waubra and Macarthur wind farms. These figures have been extrapolated for the Conroys Gap Stage 2 Wind Farm and the results can be seen in Table 7-3.

Table 7-3 Local, State and Australian construction expenditure for a 45 MW wind farm ($million)

Construction Expenditure	Local / Regional	State	Australia
Wind turbine generators	$8.64	$28.89	$42.93
Site administration and design	$1.08	$3.60	$5.36
Site construction works	$1.08	$3.60	$5.36
Site electrical works	$1.22	$4.01	$5.94
Labour	$1.35	$4.46	$6.62
Total construction	$13.37	$44.60	$66.24
Local operational expenses (annual)	$12.24	$18.90	$43.34

Using the estimations from this report, it is anticipated that $13.37 million could be spent within the region as a result of the construction phase of the wind farm.

There is an opportunity for local contracting and manufacturing services to be contacted during the site development. These may include concreting; earthworks, steel works and electrical cabling, as well as other service-related employment would follow, with the provision of food, fuel, accommodation and other services for the contractors. Based on the construction phase spanning 6 - 9 months, employment would likely increase by around 43 full time equivalent jobs across the local area. It is considered that construction, property and business services and retail trade would make up most of the employment growth. Precise economic benefits would vary based on the final site design, turbine suppliers, timing of works and other details. Currently there are no facilities capable of making turbine components (nacelles and blades) in Australia. There may be potential for manufacturing towers in Australia.

There are a number of constraints related to the potential of the socioeconomic environment described. These include supply-side constraints, primarily the supply of labour. Furthermore, the capacity of local business to service new contracts, together with the quality of local housing, amenities and other physical and social infrastructure are also factors that may affect the ability to attract and retain workers. Using the SKM model it is estimated that approximately $30,000 would be spent during the construction period by workers in the local community. Table 7-4 highlights these estimated annual values.

Table 7-4 Estimated local project expenditure within the region

Construction Annual Expenditure	Local / Regional
Accommodation	$9,543
Food	$14,314
Fuel	$5,726
Total	$29,582

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.

7.3 Agricultural Impacts

7.3.1 Existing environment

Agriculture is the main land use in the Yass Valley, occupying approximately 73% of the total land area or about 290,913 hectares (Yass, 2007). Agriculture in the region is dominated by wool production. Yass Valley LGA is diversifying its rural products; many new agricultural industries are emerging including wine, alpaca studs, olives and berries. The close proximity of Canberra to the Yass Valley LGA is assisting the establishment of these new enterprises (Yass, 2013). The shift from grazing to cropping and mixed farming is a recent trend and may be related to the recent drought conditions; this trend has been recognised as having implications for land degradation as the land capability is not suited to long-term cultivation.

In general, the project area is comprised of cleared ridges, slopes and flats containing scattered trees and forest remnants. The pasture is a mixture of native and exotic species.

The Proposal would provide a drought resistant supplementary income stream for involved land holders, compatible with current grazing practices.

7.3.2 Impact assessment - construction and decommissioning

Adverse impacts affecting the agricultural use of land within the project boundary and surrounding properties would be greatest during the construction and decommissioning phases of the development. They would centre on restrictions to stock access and potential to affect grazing land (direct loss of land, due to footings and tracks, and potential degradation of land, through erosion and sedimentation, pollution and weed ingress).

During construction and decommissioning, stock may need to be excluded from the works area and, in some cases, restricted from access roads, to minimise the risk of collisions. There are likely to be temporary speed limits enforced to mitigate the risk. The impact of exclusion of stock would be high within the project boundary which contains significant land holdings and multiple affected agricultural enterprises.

During the construction phase, soil disturbance through the construction and upgrading of tracks, laying electrical cables, excavate footings and create hardstand areas would remove pasture currently available for grazing. In many cases, this impact would be temporary, as disturbed areas would be rehabilitated before the completion of the construction phase (crane hard stand areas, access tracks not required during the operational phase and underground cable trenches). During decommissioning, further areas would be restored to their pre-existing capacity (access and spur tracks not required by the landowner, electricity easements). During the restoration activities, stock access would be periodically restricted while vegetation is re-established. The total amount of land not able to be returned to pre-project agricultural capacity is a minor proportion of the total impact area (access tracks, the footings of turbines, control building and substation).

Potential for indirect impacts is present where soil compactions, erosion, turbid runoff, weed ingress and pollution from chemical spills is not managed adequately. Impacts such as erosion, turbid runoff and weed ingress have the potential to spread, affecting much greater areas of land. Unmitigated, these impacts would reduce the productivity of the affected areas. These impacts are highly manageable, however.

Noise and dust generated during the construction and decommissioning are manageable and considered to represent negligible impacts for agricultural activities, given the mitigation proposed in the Environmental Assessment prepared for the NSW DPI.

Construction impacts are therefore considered to be largely temporary and manageable. Affected land owners would be compensated for the loss of the development footprint by way of the lease arrangements they enter into with the Proponent.

There is an opportunity to improve the native composition of the site and production capacity in some areas onsite. The ongoing expenses of resowing exotic species as well as the resultant loss of soil condition and ingress of weeds are good reasons to investigate the sustainability of using native species rather than replacing them with exotics during site restoration. The project area retains varying degrees of native understorey, a result of soil type, stocking rate and improvement practices. The rehabilitation and encouragement of native grasses onsite could have production and conservation benefits and should be explored as a potential offset to clearing during the construction phase of project development. Revegetation of disturbed and weedy areas with productive native species, excluding stock from unstable areas as well as management of the timing and intensity of grazing, could be implemented during and following site development to benefit landform stability, native vegetation diversity and may create more drought tolerant pastures.

7.3.3 Impact assessment - operation

7.3.3.1 Grazing practices

The operational wind farm is not anticipated to affect the way that involved landowners or neighbouring landowners currently manage their agricultural activities. Nor is it anticipated to affect the production capacity of the land, apart from a minor loss of the available grazing area taken up directly by the foot print of the Proposal which will be approximately 2% of the land involved. The operational wind farm provides a benefit to involved landowners, a supplementary drought resistant income stream throughout the life of the project.

7.3.3.2 Agricultural agriculture

The use of aeroplanes and helicopters for agricultural purposes such as crop dusting, spraying and fertilising occurs throughout the Southern Tablelands and in the region of the wind farm.

Agricultural operations involving low level flying can only occur in good conditions (high visibility) in accordance with the aviation regulations. It is considered that these conditions would be conducive to wind turbines being readily observable. Pilots who are engaged in low level flying and agricultural operations are required to undertake a risk assessment for each flight. This would identify specific hazards such as trees and powerlines and wind turbines would be treated no differently. An aeronautical assessment confirmed that the location of the wind farm and any of its individual turbines will not impact on the approach, circuit work or take-off of aircraft from any of the identified aerodromes, airfields or airstrips in the region. Advice from a local operator was that the wind farm would present no operational issues for the agricultural operations.

8 Other Approvals & Conditions

8.1 State Government Legislation and Policy

Planning approval for major projects like the Conroys Gap Stage 2 Wind Farm in NSW is governed by the *Environmental Planning and Assessment Act 1979* (*EP&A Act*).

Transitional Part 3A Project

Yass Valley Wind Farm (of which Conroys Gap Stage 2 is part of) is a transitional Part 3A project (*EP&A Act,* Schedule 6A Transitional arrangements—repeal of Part 3A – clauses 1, 2 and 3).This is due to the fact that it has a capital investment value of more than $30 million and was confirmed to be a project to which Part 3A of the EP&A Act applies by the Director-General of the Department of Planning and Infrastructure on 28 October 2008. Part 3A continues to apply to Yass Valley Wind Farm because Director General's Requirements were issued before 1 October 2011 (on 12 January 2009), and because this EA is lodged by 30 November 2012, or as extended by DPI.

The local Councils are not the Consent Authority for this project, and there is no obligation to comply with all relevant Development Control Plans (DCPs) prepared by each Council. However, compliance or otherwise against these DCPs must be taken into consideration in carrying out the assessment.

Critical Infrastructure

Given that the proposed Yass Valley Wind Farm will be capable of generating more than 30 MW of electricity from renewable energy resources, it is a 'critical infrastructure project' under former Part 3A (former section 75C EP&A Act; *Government Gazette* 27 November 2009 page 5841; letter from Department of Planning to Proponent dated 28 October 2008*).*

Consent Authority

The Minister determines transitional Part 3A projects (former section 75J(1)). The Minister has delegated this power to the Planning Assessment Commission (Government Gazette, 28 September 2011, page 5682). If the Commission proposes a voluntary planning agreement, the instrument of delegation requires the Commission to first consult with the Minister.

Director General's Requirements

The NSW Director General of the Department of Planning has issued requirements for Epuron to consider and address in this EA (known as the Director General's Requirements or DGRs). These requirements incorporate inputs from the various government agencies that will provide advice to the Department in the assessment of this proposal.

The steps in the planning determination process are outlined in Table 8-1.

Table 8-1 Planning Assessment Process

Stage of the Assessment	*Description*
Project Application and Preliminary Environmental Assessment	A Preliminary Environmental Assessment (PEA) is conducted by the Proponent to support the Project Application and give context around the site and potential issues that would need to be considered.
Director General Requirements (DGRs)	Using the PEA and advice from other governmental departments the Department of Planning and Infrastructure (DPI) issues DGRs. This is a list of issues that must be addressed by the proponent in an EA
Environmental Assessment and Consultation	The Proponent prepares an EA following the DGRs. This involves extensive studies to be conducted on site as well as consultation with the local community and other stakeholders.
Submission and Departmental Review of the EA	The Proponent submits the EA and supporting studies to the DPI who undertakes a review of the EA to ensure the document is acceptable and addresses all issues raised in the DGRs. The DPI may require further work to be carried out by the Proponent. The Yass Valley Wind Farm EA was

Stage of the Assessment	*Description*
	submitted to the DPI in November 2009
Public Exhibition	The EA is placed on display locally and electronically for the public to review and provide feedback via submissions to the DPI. It is expected the EA will be on display for a minimum of 60 days.
Response to Submissions	The DPI provides the Proponent with a summary of issues raised in submissions. The Proponent is required to respond to each issue that is raised in the submissions and submit a Submissions Report to support the EA.
Determination	The DPI considers the EA and the Submissions Report, preparing its advice and recommendations for the Minister for Planning and Infrastructure, and the Planning Assessment Commission (as delegate of the Minister) determines the application.

9 Information Sources Provided in the Preliminary Documentation

This Additional Information Report has been prepared by Epuron Pty Ltd with significant input from **ngh**environmental, particularly for sections 3, 4, 5 and 6.

The information within the report is current as of the date of this report.

The methodologies for the environmental assessment, including fieldwork, are described in sections 3 and 4 of this report including references to other sources where relevant.

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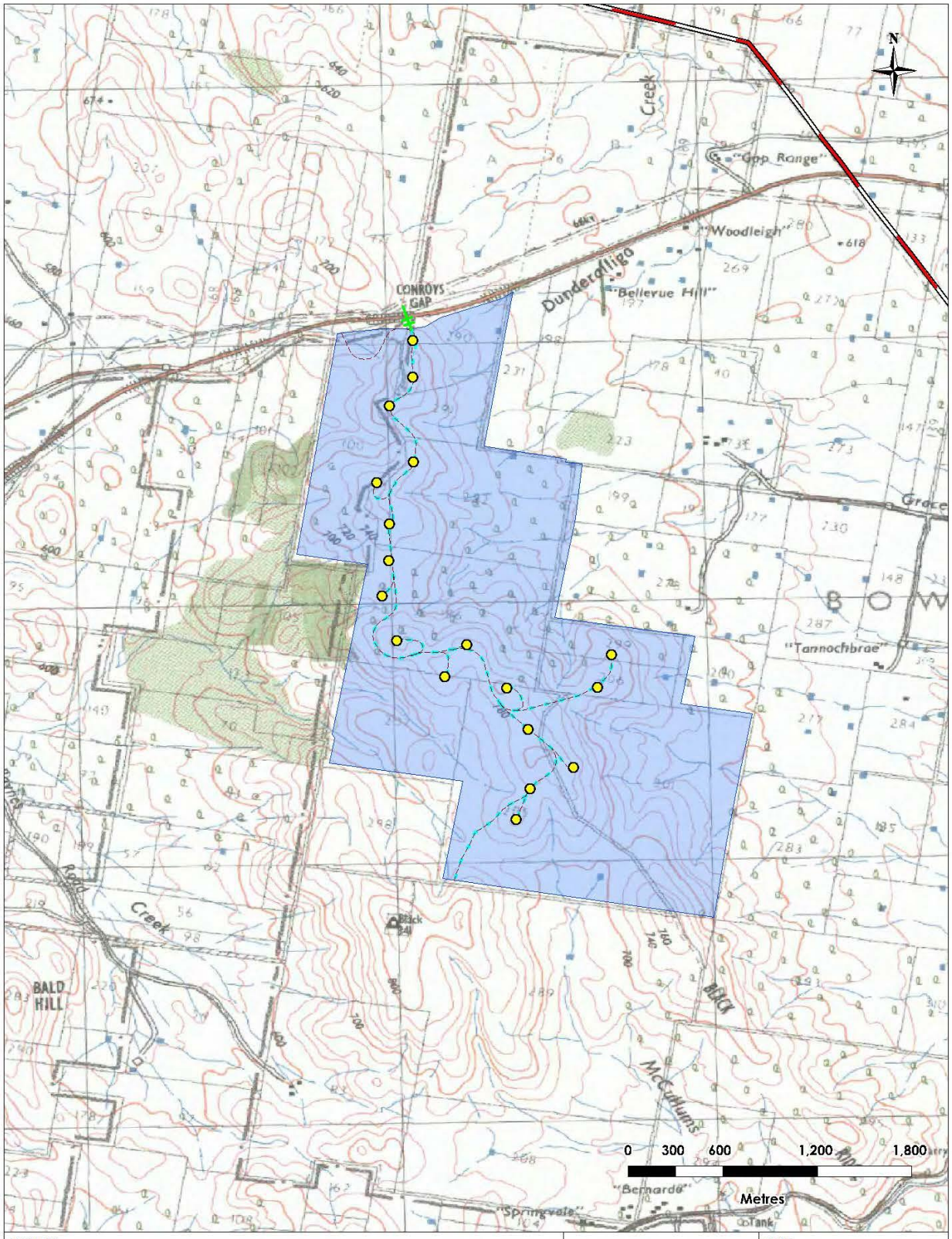
Appendix A – Site layout



LEGEND

- Conroy's Gap Stage 2 project area
- Proposed wind turbine
- Proposed access track
- Proposed overhead electrical reticulation
- Proposed underground electrical reticulation
- Existing 132 kV transmission line

EPURON

PROJECT
Conroy's Gap Stage 2 Wind Farm

TITLE
Project Overview

SCALE	DATE	DRAWN
1:30,000 at A4	02/09/13	MK

Appendix B – Survey effort