Environmental Resources Management Australia

Level 4, Watt Street
Commercial Centre
45 Watt Street,
Newcastle NSW 2300
AUSTRALIA

PO Box 803,
Newcastle NSW 2300
AUSTRALIA

Telephone +61 2 4903 5500
Facsimile +61 2 4964 2152

www.erm.com

12 December, 2014

Shaq Mohajerani
Union Fenosa Wind Australia Pty Ltd
Suite 403, 68 York Street
SYDNEY NSW 2000

Our Reference:20141210_PYWF_0131035_Response to Submission Cover Letter_Final.docx

Dear Shaq,

RE: PALING YARDS WIND FARM RESPONSE TO SUBMISSION

Please find attached our finalised responses to the ecology and heritage focused public and agency submissions you had requested ERM consider, following the public exhibition of the Paling Yards Wind Farm Environmental Assessment Report (EAR).

These were provided to Union Fenosa Wind Australia (UWFA) as draft documents for review and comment on 7 November 2014. UFWA provided marked up documents with tracked changes for ERM's finalisation on 9 December 2014. ERM has now finalised these documents for UWFA's Preferred Project and Response to Submissions Report (PPRSR).

Please do not hesitate to contact the undersigned if you have any further questions, or if we can assist further with progressing the Paling Yards porject.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

Matthew Flower
Project Manager

Steve Laister
Partner

Annex A - Ecology response to submissions
Annex B - Heritage response to submissions
Annex C - Bird and bat monitoring strategy
Annex D - Offset strategy

Annex A

ECOLOGY RESPONSE TO SUBMISSIONS

Table A1 Ecology - Response to Submissions

Submission ID.	Main Issue	Detailed Submission	ERM Response
98743	Increased Bushfire Risk	The proposed Paling Yard Wind Farm site is surrounded by the Abercrombie National Park. There is an increased risk of bush fire due to the increase in dry fuel from the drying effect. This increased risk affects everyone in the district.	The EA recognises that the presence of dense areas of native vegetation to the west (Abercrombie National Park) and to the east on private land, combined with the steep topography to the south of the site, increase the risk of bushfire in this region. A detailed literature search has not sourced scientific information on the drying effect of wind farms resulting in increases to dry fuel loads. In terms of bushfire risk, a Fire Management and Emergency Response Plan will be prepared as part of the site management plans following project approval, in consultation with State and local RFS, and the State Planning Department. This plan will include a detailed risk assessment (using ISO 31000 risk management standard or similar) and should be conducted for the project across all stages of the development and operation to evaluate the fire risk and to guide mitigation requirements, including emergency response. This process will aim to ensure that appropriate measures are in place to prevent fire and minimise damage in the unlikely event of an emergency.
		There is also an increased risk from the number of vehicles accessing the property to perform the construction phase and ongoing maintenance. If fire were to spread into the Abercrombie National Park, the effect would be catastrophic. The park is some of the most difficult terrain in NSW and connects through to other national parks, which form the largest area of bushland in NSW.	A Fire Management and Emergency Response Plan will be prepared as part of the site management plans following project approval, in consultation with State and local RFS, and the State Planning Department, including an assessment of the existing road network and adequacy of the existing fire breaks. This plan will also be consistent with the 'Abercrombie River National Park Fire Management Strategy' prepared for the adjacent land by the NSW Parks and Wildlife Service (2005) and will include considerations of vehicle management during construction and operational periods. In addition to the management actions already stated within Chapter 16 of the EA, all site vehicles during the construction phase will have diesel engines and will use the site access roads to minimise the likelihood of igniting dry grass. Construction and maintenance staff will also be trained in the basic first response fire-fighting techniques including: • communication and reporting requirements such as alerting emergency crews (000) and reporting details of location, size, proximity to assets and access capabilities. Reporting procedures and mechanisms should be efficient and simple to ensure that potential issues are identified, inspected and rectified in a timely manner;

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			• maintaining provision for mobile telephone (or satellite telephone if required) and UHF radio communications; • use of a dedicated 10,000 litre tanker (to be available on site daily during the construction phase of the development, particularly during the bushfire season or when high risk activities such as welding are being undertaken). The bushfire season (or Fire Danger Period) runs from 1 October 1 to 31 March, however it may vary due to local conditions and will be declared by the NSW RFS for each Local Government Area; and • use and location of extinguishers, knapsacks and hoses.
		Wind farms mean that bushfire cannot be fought with aircraft. Therefore any outbreak of fire will develop into a potentially large fire because of the inability to jump onto an outbreak quickly with aircraft. Local land owners would have no protection from such a large and devastating fire. There would be mass destruction of wildlife, farm animals, dwellings and other farm improvements. There is great potential for loss of human life as there are very few roads in and out of the district; most of these roads are surrounded by bush.	Wind farms do not generally prevent the use of aircraft to fight bushfires. In relation to fire-fighting methods, any fire-fighting activities in the vicinity of the proposed wind farm by either fixed or rotary wing aircraft would need to be conducted in consideration of the location of the wind turbines and monitoring masts. Therefore, the location of the wind turbines and monitoring masts will be made available to New South Wales Rural Fire Service (RFS) and aerial agriculture operators.. Wind turbines, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan. Turbines are treated like any other obstacle and aerial bombing will not be restricted within surrounding properties or the National Park. The expanded road network and road condition upgrades may benefit the locality in terms of access and egress in the event of a fire. Whilst aerial fire-fighting operations will potentially be restricted in the immediate vicinity of the proposed wind farm itself, as confirmed by Aviation Projects (2012), there is still a valid (ground-based) means of fighting bushfires on and near the properties on which the wind farm is proposed to be located. Wind farms can also be an advantage to RFS operations, because they require a cleared area, a water supply, and provide improved access to the property.
98743	Impacts to birds	There has been no consideration given to the effects on nearby properties, the National Park and wildlife. Any birds trying to fly from one side of the Abercrombie National	The surrounding forested areas will provide higher value habitat for the majority of fauna than the Development Footprint and will contain higher abundances and diversity of species. This may increase the collision risk within the Development Footprint, if birds and bats traverse the development area from forest to forest. Whilst such traverses may occur to some extent, it is not

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		Park through a natural flight path to the other side of the National Park will most certainly be shred to pieces.	considered likely that large numbers of species will cross the Study Area, because the Development Footprint is higher than the majority of the surrounding area which would increase energy expenditure required for species flying over the plateau area. In addition, the open nature of the site will deter species which are vulnerable to predation in open areas. There were no potential movement corridors identified within the Development Footprint such as vegetated corridors or narrow cleared areas or saddles between forested areas. For species that do move through the Study Area, the Paling Yards Project layout provides spaces of approximately 400 m between turbines, which would be expected to allow bird and bat species to move between turbines. There is also potential for wind farms to act as a barrier to flying birds, causing them to avoid the area and hence take another flight path. While there is little research into avoidance rates exhibited in Australia (Smales 2006), biodiversity monitoring at two wind farms in Tasmania did not provide evidence of a barrier effect (Hull, undated).
98922	Increased Bushfire Risk	The proposed Paling Yard Wind farm site is surrounded by the Abercrombie National Park. There is an increased risk of bush fire due to the increase in dry fuel from the drying effect.	As above
		There is also an increased risk from the number of vehicles accessing the property to perform the construction phase and ongoing maintenance. If fire were to spread into the Abercrombie National Park, the effect would be catastrophic. The park is some of the most difficult terrain in NSW and connects through to other national parks, which forms the largest area of bushland in NSW.	As above

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100431	Location of transmission line not assessed	The map on public exhibition only shows one route for the line - not two as shown on maps supplied by Union Fenosa. Both lines cross my properties 'Hilltop' and "The Brothers'. I ask that both proposed transmission lines sites be environmentally impact assessed.	The Northern Transmission Line Route has multiple options, the grid connection negotiations with the Transmission Authority will continue to identify the most cost-effective grid connection configuration and transmission line corridor, and if the final preferred location is different to the two locations proposed in the EIS, Union Fenosa Wind Australia will undertake additional assessment of that location and associated corridor and seek an amendment to the development consent.
100345 - Oberon Shire Council	Accurate identification of the access locations	Accurate identification of the access locations is also important to determine if any significant vegetation will need to be cleared.	Access points to the site are off Abercrombie Road (refer *Figure 1A and 1B*). Of the six access points, two will require the removal of planted, non-native Pine trees (*Pinus radiata*), and the remaining four will avoid trees that are present (only two of these four have native trees nearby and these will be avoided).
100341 _ OEH	Assessment of Impacts	The area of impact differs between the Environmental Assessment and the SER and requires clarification. The EA reports a total impact of 0.75 ha while the SER reports a total permanent impact of 12.6 ha. A further 1.4 ha is deemed to be temporary impact. The EA states that the entire 0.75 ha impact is of Western Tablelands Dry Forest emphasising the remaining turbines are within improved pasture and "are not representative of Derived Native Grassland". In contrast the SER reports a total of 2.9 ha of Apple Box – Yellow Box dry grassy woodland occurring as Derived Native Grassland within the development	The vegetation survey methodology for the most recent survey undertaken by ERM as reported in the Supplementary Ecology Report (SER) was based on with a combination of qualitative field observation and plot/transect data collection according to the BioBanking Assessment Methodology (BBAM) (DECC 2009). The Environmental Assessment (EA) identified remnant vegetation as Western Tablelands Dry Forest which has been further refined and described as four separate communities: • Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands; • Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands; • Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion; and • River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions. The ERM survey confirmed that the majority of the Development Footprint consists of improved pasture although small patches of derived native grassland with scattered Apple Box (*Eucalyptus bridgesiana*) and Yellow Box (*E. melliodora*) trees were confirmed around the periphery. These areas

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		Footprint, of which 1.9 ha will be impacted. Recommendation: 1.1 That the actual area of impact be clearly described and quantified.	(mapped as Apple Box - Yellow Box dry grassy woodland) constitute the TSC Act-listed EEC: White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland). These areas are highly modified from their pre-European condition and occur along undulating slopes of the Study Area in discrete patches and are currently used as grazing lands (hence their previous classification in the EA as cleared pasture). In additional to the more clearly defined vegetation communities, the boundaries of vegetation have also been reassessed during the most recent surveys by ERM, and has included detailed mapping along the access tracks and the northern transmission line which were omitted from the original area calculations provided in the EA. The actual area of vegetation to be removed will be:

	Veg Type 1	**Veg Type 2**	**Veg Type 3**	**Veg Type 4**	**Veg Type 5**	**Veg Type 6**	**Veg Type 7**	**Total**
Turbine Footing and access tracks (permanent clearance)	1.9	0.1	0	0	1	0.2	0	**3.2**
Crane Handstand (temporary clearance)	1	0	0	0	0.4	0	0	**1.4**
Transmission Lines (partial clearance)	0	6.8	0	2.3	0	0	0.3	**9.4**
Total Cleared	**2.9**	**6.9**	**0**	**2.3**	**1.4**	**0.2**	**0.3**	

Veg Type 1: Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (this vegetation forms part of the TSCAct-listed Box Gum Woodland EEC occurring in the Study Area as Derived Native Grassland)

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			Veg Type 2: *Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Mod* *Veg Type 3:* *Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Poor-Grassland* *Veg Type 4:* *Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Shrubby* *Veg Type 5:* *Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Mod* *Veg Type 6:* *Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Shrubby* *Veg Type 7:* *River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions_Mod-Good_Poor-Weedy*
			These calculations are based on: <u>Permanent</u> • 6m wide access tracks • 20 x 20m wide turbine footings • 250m by 210m construction envelope for the substation • 70m wide transmission line easement (partial clearance only) • 1 x 1m wind monitoring masts (x7) <u>Temporary</u> • 80 x 80m construction envelope for the batching plant • 50 x 50m wide crane hardstands • 10m wide access tracks (only 6m wide will be permanent)

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	Avoidance	The EA does not contain sufficient explanation regarding avoidance measures. Several turbines have been removed from the proposal therefore eliminating impact to Box Gum woodland within existing Commonwealth Conservation agreements. While OEH welcomes the avoidance of these Box Gum woodland remnants it is stated several times within the EA that approval for these turbines may be sought at a later date.	There are currently no plans or applications for the placement of wind turbines within the areas covered by the Commonwealth Conservation agreements.
		OEH again reiterates that placement of turbines within firstly an existing conservation agreement and secondly within an area of Box Gum Grassy Woodland Endangered Ecological Community should be avoided where possible to do so. An additional turbine within remnant vegetation has been deleted and a further three have been relocated to sites just within the remnant. While this reduces impact there is no discussion regarding why deletion of all four turbines, or further relocation outside the remnant, is not feasible. Recommendations: 2.1 That the proponent ensures that all avoidance measures implemented in finalising the location and design of the	2.1 The turbines in the remnant area have been moved closer to the cleared area to reduce the amount of vegetation clearing while keeping the minimum separation distance from other proposed turbines to minimise the wake loss effect on adjacent turbines. The microsited locations are placed on ridgelines that have the benefit of reasonably unobstructed access to the predominant wind direction. In consideration of the extensive grid connection requirement, the proposed project requires as many turbines as feasible to maintain project viability, and therefore turbines P10, P13 and P14 form part of the project. 2.3 Ecological values have been considered during the design process and various project components have been located to minimise impacts on ecological values as far as practical whilst considering the technical capacity and viability of the project. The fundamental protocol for the final design is to avoid areas of native vegetation where possible. 2.3 The proposed micrositing has completely removed all proposed infrastructure (including turbine P2, P6 and P7) to avoid impacts to the Box Gum Woodland conservation area, and has removed turbine P11 from the outstretched ridgeline to avoid the heavily vegetation area, along with relocating turbines P10, P13 and P14 closer to the edge of the cleared area, which has significantly reduced the vegetation clearing.

Submission ID.	Main Issue	Detailed Submission	ERM Response
		facility are provided; 2.2 That the level of avoidance implemented is justified; and 2.3 That the DPE include a condition of consent ensuring that turbines are not placed within existing Commonwealth Conservation agreements containing Box Gum Grassy Woodland EEC.	
	Bird and Bat Collision	The EA has not adequately justified conclusions related to the risk of bird and bat collision and the significance of this impact. The SER provides a more comprehensive assessment of bird & bat strike although concedes that while the expected risk to bats at risk from rotor collision would be small this has yet to be confirmed. Neither assessment adequately discusses the likely influence of weather conditions commonly occurring at the site on bird collisions. Sites which experience poor weather and/or low visibility conditions need to be assessed taking this into account because it is likely to influence flight behaviour and increase the likelihood of impacts. While the SER raises some additional factors that could potentially influence the	*Weather conditions* Poor visibility due to weather conditions (fog and rain) is often cited as a factor increasing risk of collision with structures, including wind turbines (Osborne *et al*. 2000; Drewitt and Langston 2006). In an American study (Arnett *et al*. 2005, cited in Strickland *et al*. 2011) it was found that wind speed and weather were significantly related to bat fatality. Nights with storms accompanied by high wind speeds had fewer fatalities, and nights immediately after storms accompanied by low wind speeds had higher fatalities (Arnett *et al*. 2005, cited in Strickland *et al*. 2011). In a second North American study, Osborn *et al*. (2000) identified that poor visibility may have contributed to two of eight bird mortalities related to collisions with turbines. Drewitt and Langston (2006) acknowledge that the increased risk of collision may be offset to some extent by lower levels of flight activity in poor weather conditions. The nearest available visibility data for the study area was taken from Bathurst Airport, approximately 90 km north of the study area (BoM 2010). These data indicate that reduced visibility occurred more frequently in autumn and winter.

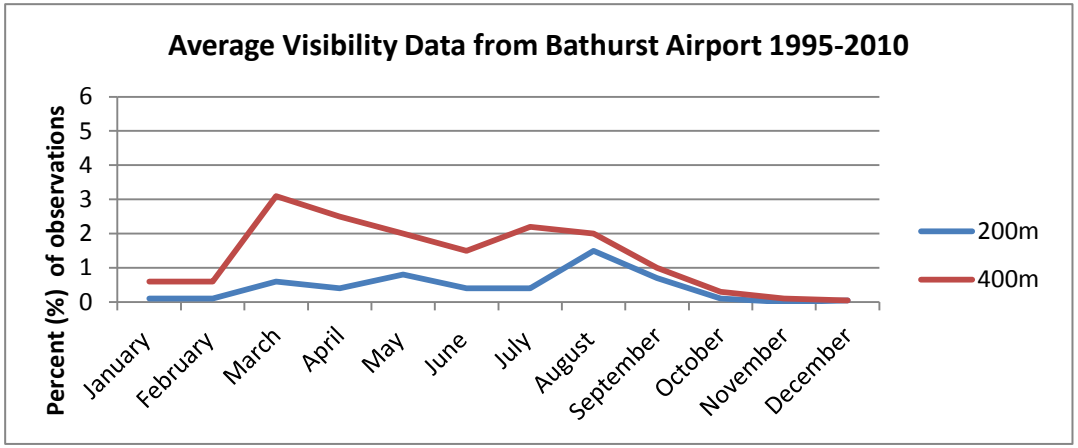
Submission ID.	Main Issue	Detailed Submission	ERM Response

susceptibility of bats to rotor strike there is little discussion of them. Additional risk factors relevant to consideration for an adequate impact assessment on all bat species known and likely to occur at the site include.

- Tree-roosting species may perceive turbines as potential roost trees;
- Ridge-top sites might coincide with availability of insect prey;
- Migrating bats may rely on sight (rather than echo-location) to navigate, being drawn to large structures on ridge-tops;
- Bats may investigate moving blades as movement may be mistaken as evidence of prey;
- Audible sound from turbines may attract bats from considerable distances; and
- Mating behaviour of tree-roosting bats may be centred on the tallest prominent feature in landscape.
- Risk of concussion from passing through low-pressure areas near turbines.

<u>Recommendation:</u>

3.1 That the Proponent take into account weather in assessing impacts on birds and bats, as well as further consideration of the above mentioned risk factors.



While collision risk factors are likely to vary across sites, and between countries (Hull and Cawthen 2012), it is reasonable to expect that poor visibility due to weather conditions may increase the risk of collision within the study area. Based on BoM data displayed above (BoM 2010), reduced visibility coincides with the colder months of the year when both bird and bat activity is reduced. This will reduce the likelihood of any additional impacts to birds and bats, above those already addressed within the SER (ERM 2013).

Where possible, the data obtained during the bird and bat monitoring program will attempt to provide further information on the potential correlation between weather patterns and any observed increases in collision rates.

Additional risk factors relevant to bats

Evidence of mechanisms for bat mortality at wind farm sites specific to Australia is limited (Hull and Cawthen 2012) although numerous international studies have identified a lack of a relationship between species richness and abundance of bats using a site, and the species richness and abundance of fatalities (Cryan 2010). This suggests that some species of bats are more prone to impacts than others (based on their habitat and/or behavioural characteristics) as outlined bdelow:

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			This has also been reported at the Bluff Point and Studland Bay Wind Farms in Tasmania where analysis of 8 years of monitoring data (2002-2010) has shown that only two of the four species recorded at the site (the Gould's Wattled Bat and Vespadelus sp) have been involved in collisions (Woolnorth Wind Farm Holding, 2013). • Tree-roosting species may perceive turbines as potential roost trees, Cryan (2010) notes that it is plausible that bats could mistake turbines for tall trees. Bats may be attracted to them as a higher number of roosting opportunities may be available in taller trees, partly due to size and also due to the related maturity of the tree and hence likelihood of presence of cavities, loose bark and crevices (Cryan 2010). Cryan (2010) identified this possibility as particularly relevant to migratory bats. In Australia, bats display some migratory behaviour, however migrations are only local (BL&A 2011). Hull and Cawthen (2012) acknowledged that collisions of Goulds Wattled Bat (*Chalinolobus gouldi*), thought to be a tree-roosting species and present within the study area, at two Tasmanian wind farms, may support the theory that bats investigating turbine towers as potential roost sites or gathering sites for mating may contribute to the risk of bat mortality. The Eastern False Pipistrelle and Greater Broad-nosed Bat are both listed as vulnerable and roost in trees. Calls detected during a survey of the study area may be attributed to these species (although unable to be confirmed). There is potential for these species to perceive turbines as potential roost trees, thereby increasing the level of interaction with turbines, and consequent risk of collision and barotrauma. *[Baratrauma - moving turbine blades have areas of relatively high and low pressure, with an area at the tip of each blade having a drop in atmospheric pressure sufficient to cause internal injuries and tissue damage to air-containing structures].* • Migrating bats may rely on sight (rather than echo-location) to navigate, being drawn to large structures on ridge-tops; Bats are thought to rely on visual cues (such as tall trees and turbines) during long-distance navigation, as visual cues may be detectable from greater distances than acoustic cues (Cryan 2010). Cryan and Barclay (2009) note that turbines may attract bats from distances greater than 1 km.

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			In Australia, bats display some migratory behaviour but migrations are local and not considered to cover significant distances (BL&A 2011). The Eastern Bentwing-bat (listed as vulnerable and assumed to occur in the study area) migrates annually to maternity caves from distances up to approximately 300 km, and may travel up to 65 km in a night (OEH undated). It is possible the Eastern Bentwing-bat could exhibit this type of behaviour during long-distance navigation, thereby increasing the risk for collision with turbines, or barotrauma. • Ridge-top sites might coincide with availability of insect prey; Cryan and Barclay (2009) describe 'hilltopping' behaviour by insects, in which flying insects are attracted to the tallest structures in the landscape during the daytime. In this event, bats may learn to use wind turbines as foraging sites. There is limited research into this phenomenon in Australia, however bat carcases found around turbines in Tasmania showed no evidence of their having recently been feeding around turbines (Hull and Cawthen 2012). It is currently unclear if insect species would exhibit this hilltopping behaviour, with a consequent effect on bat behaviour, within the study area. • mating behaviour of tree-roosting bats may be centred on the tallest prominent feature in landscape. Cryan (2010) notes that the potential perception of turbines as potential roost sites, the use of tall features (such as turbines) in navigation and the potential availability of insect prey at turbines may have contributed to bats evolving mating behaviours that focus on the tallest trees in the landscape. Cryan (2010) notes that species for which sexes have separate distributions outside of the mating period may be more likely to use the highest trees as rendezvous points during the mating period. Hull and Cawthen (2012) acknowledged that collisions of Goulds Wattle Bat (*Chalinolobus gouldi)*, thought to be a tree-roosting species and present within the study area, at two Tasmanian wind farms, may support the theory that bats investigating turbine towers as gathering sites for mating may contribute to the risk of bat mortality. Although, mortality was most prevalent in Autumn, a period of post-reproduction for the species (Hull and Cawthen 2012). • Risk of concussion from passing through low-pressure areas near turbines.

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			Moving turbine blades have areas of relatively high and low pressure, with an area at the tip of each blade having a drop in atmospheric pressure sufficient to cause internal injuries associated with barotrauma, rather than concussion; these aspects are discussed in the SER. • Bats may investigate moving blades as movement may be mistaken as evidence of prey Thermal images of bats appearing to chase moving blades suggest that bats may be attracted to blades (Cryan and Barclay 2009). It is unknown how prevalent this behaviour is, or if this behaviour would be exhibited by the species present at the study area would, however it is possible this factor could attract species to turbines, thereby increasing the risk of collision or barotrauma. • audible sound from turbines may attract bats from considerable distances There are reports of bats being attracted to the 'swoosh' sound of sticks being waved through the air, suggesting bats may also be attracted to sounds produced by moving blades (Cryan and Barclay 2009). It is unknown how prevalent this behaviour is, or if this behaviour would be exhibited by the species present at the study area, however it is possible this factor could attract species to turbines, thereby increasing the risk of collision or barotrauma. *Summary* Overall, while a number of hypotheses have been presented to describe the causes of bat mortality related to wind turbines, the lack of evidence of these causes, and particularly lack of evidence in an Australian context, makes it difficult to quantify potential impacts to bat species. Hull and Cawthen (2012) found that high-flying, open-air foraging bats are more at risk of fatality at wind turbines than other species. Males and females were impacted similarly, but there was a predominance of adults suggesting that the Tasmanian Windfarms were not resulting in mortality of dispersing juveniles and sub-adults. Based on the data available it is unlikely that the impacts to bats would be significant at a population scale and there may be opportunities for the Bird and Bat Monitoring Plan developed as part of this Project to contribute to the understanding of interactions between bats and turbines in an Australian context.

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	Indirect Impacts	The EA does not adequately address the potential for indirect impacts to fauna on the development site. There is a growing literature indicating that wind farms can have a detrimental impact on how fauna, particularly migratory species, utilise habitat surrounding turbines. Indirect impacts include, but are not restricted to: • significant alteration of flight paths, • change in habitat use patterns, • changes in occupancy or population densities and • changes in breeding success. The SER acknowledges the potential for indirect impacts in Section 4.2.4 stating that "Careful planning to avoid placement of turbine clusters in or near areas of high habitat value will manage the alienation of habitat to threatened woodland species". Although turbines P10, P13 and P14 have been resited they are still situated within remnant woodland and thus have the potential to indirectly impact fauna. OEH suggests that consideration should not be restricted to species listed on the EPBC Act or TSC Act. <u>Recommendation:</u>	*Alteration of flight paths* There is potential for wind farms to act as a barrier to flying birds, causing them to avoid the area and hence take another flight path. While there is little research into avoidance rates exhibited in Australia (Smales 2006), biodiversity monitoring at two wind farms in Tasmania did not provide evidence of a barrier effect (Hull, no date). Bird Utilisation Surveys conducted as part of the SER did not identify any migratory birds, and no species were observed exhibiting direct movement at height over the landscape as would be expected from migrating species. In addition, it is not considered likely that large numbers of species will cross the Study Area. This is due to the Development Footprint being higher than the majority of the surrounding area which would increase energy expenditure required for species flying over the plateau. The open nature of the Study Area is expected to deter species which are vulnerable to predation in open areas. There were no potential movement corridors identified within the Development Footprint such as vegetated corridors or narrow cleared areas or saddles between forested areas. For species that do move through the Study Area, the Paling Yards Project layout provides spaces of approximately 400 m between most turbines, which would be expected to allow bird and bat species to move between turbines. *Change in habitat use patterns and changes in occupancy or population densities* There is limited research on changes in habitat use, occupancy and population densities of birds and bats due to wind farms in Australia. The findings of a 10 year monitoring program for two wind farms in Tasmania showed a general reduction in biodiversity across the survey period within both the wind farm site and reference sites, with the decline commencing prior to construction. A synthesis of available research in the United States (The Wildlife Society 2007) summarised the following findings for bird species groups in the United States: • reported grassland bird densities were lower within 80 to 100 m of wind turbines; • in one study, raptors were observed to not nest within a 32km^2 wind facility, despite it having similar habitat to a nearby area with 5.94 nests/100km^2. However, other studies reported raptors nesting within 800 m of wind farms; and

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		4.1 That the Proponent assesses the potential for indirect impacts of turbines on fauna.	• reported densities of some waterfowl were lower within 600 m of wind turbines, however other species appear to experience no displacement effect. While not directly transferrable to Australian conditions and Australian species, these findings can give an indication of the scale of potential displacement of bird species. It is unclear to what extent operation of wind turbines may displace bird and bat species present in the study area, however it is recognised that displacement will reduce the number of birds interacting with turbines, consequently reducing the risk of collision. *Changes in breeding success* Wind farms may indirectly impact breeding success through displacement of fauna from breeding locations, or mortality of individuals which would otherwise breed. A study of two fauna at two Tasmanian wind farms indicated that eagles continued to breed successfully at the wind farm sites, at the same or a higher rate than other areas of Tasmania. Additionally, a study of bat mortality at these sites identified that mortality was highest in autumn, a predominately post-reproduction period, suggesting the timing of bat fatalities would not result in the direct loss of young (Hull and Cawthen 2012).
	Monitoring & Mitigation	<u>Recommendations:</u> 5.1 That the proponent develop a Bird and Bat Monitoring Plan that provides detail of how impacts on bird and bat populations will be monitored, including details on survey locations, parameters to be measured, frequency of surveys and analyses and reporting, and contains mitigation measures that will realistically reduce fatalities. 5.2 That the DPE include a condition of consent requiring a monitoring program capable of detecting any changes to the	A Bird and Bat Monitoring Strategy has been developed (draft attached). Bird and bat monitoring post construction is becoming routine practise both in Australia and overseas. There are no consistent standards in Australia for undertaking monitoring and this draft strategy provides a framework that can be used for development of a detailed Bird and Bat Management Plan for the operational phases of the wind farm once approved. It outlines an indicative and adaptive program for monitoring the effects of each turbine and provides guidance on bird and bat management in general.

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		population of birds and/or bats that can reasonably be attributed to the operation of the project. This may require data to be collected prior to the commencement of construction. Data relating to mortality rates should be submitted to OEH on an annual basis for the first five years of operation and every two years thereafter.	
	Offset Proposal	As indicated in Issue 1 above, Assessment of Impacts, the EA reports a total impact of 0.75 ha while the SER reports a total permanent impact of 12.6 ha and a further 1.4 ha of temporary impact. Accordingly, the EA proposes no Offset Proposal while the SER includes a BioBanking Credit Calculator Report indicating the need for an offset of 289 credits, equating to 31.1 hectares. Statement of Commitment number 59 states that "The proponent will develop an offset package in accordance with the Principles for the use of biodiversity offsets in NSW". Recommendation: 6.1 That the offset requirements be clearly described and quantified and that a biodiversity offset strategy be prepared in consultation with OEH.	Offset Strategy (draft attached)

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Annex B

HERITAGE RESPONSE TO SUBMISSIONS

Table B1 Heritage - Response to Submissions

Agency	Submission Comment	ERM Response
Oberon Shire Council (ID 100345) Item 10	It is noted that the applicants have stated that a Cultural Heritage Management Plan (CHMP) be provided for the development prior to any construction works. As part of any approval, Council will assess the Plan prior to any activity on site. It is considered that this Plan must include how on-going education for contractors will be undertaken to advise of potential sites and recognition of potential artefacts whilst in the construction phase. Any Plan of this nature will need to be approved by the relevant Agency and Council.	A CHMP will be developed as part of the site management plans following project approval. The draft CHMP will include measures for on-going contractor cultural heritage education and awareness to assist recognition of potential sites and places during the construction phase of the project. The Draft CHMP will be forwarded to the Representative Aboriginal Parties (RAPs) for review and endorsement and submitted to both OEH and the Oberon Shire Council for approval.
Office of Environment and Heritage (OEH)	OEH notes that archaeological sites were identified but only one site (P8) is likely to come within the zone of potential impact by turbine placement and construction. A minimum 100 metre separation is recommended in the Cultural Heritage Impact Assessment although there appears to be some uncertainty as to the extent of the potential surface or sub-surface deposits. OEH recommends that the extent of this site be determined prior to work commencing and ensure micro-siting of turbines to avoid the site.	A CHMP will be developed prior to the construction phase for the project and will include measures for subsurface test excavation at Site P8 to determine the extent of the site. This will allow the proponent to micro-site nearby turbines to avoid potential impacts. The test excavation will be undertaken in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). Tasks will involve: • Consultation with RAPs and an offer of participation in the subsurface investigation; • At least 14 days written notification to OEH and submission of the sampling strategy to OEH; • Two archaeologists for approximately one to two days fieldwork; • Completion of an Aboriginal Site Impact Recording Form for submission to the NSW Aboriginal and Heritage Information Management System AHIMS Registrar; and • Preparation of an Archaeological Report to document results of the investigation.

Agency	Submission Comment	ERM Response
Office of Environment and Heritage	OEH also notes that proposed mitigation measures (Section 18.5) recommend that once proposed access track locations and other disturbance areas are pegged on the ground, additional targeted surveys of these areas should be undertaken. This is of particular importance where infrastructure intersects with locations of potential higher use by Aboriginal people in the past, such as watercourses.	As part of the preparation of the CHMP, prior to construction work and following final footprint design, targeted surveys of pegged access tracks and other disturbance areas will be undertaken in consultation and collaboration with the RAPs to identify potential Aboriginal heritage values at risk of impact by the project. Particular attention will be paid to areas of potential higher use by Aboriginal people in the past, such as watercourses. This will likely be undertaken over two to three days by one archaeologist with participation of RAPs. If additional sites are identified during these surveys, an assessment and strategy for the management of the sites will be included in the CHMP for the project. The CHMP will be provided to the RAPS for review and approval and submitted to OEH and the Oberon Shire Council for approval.

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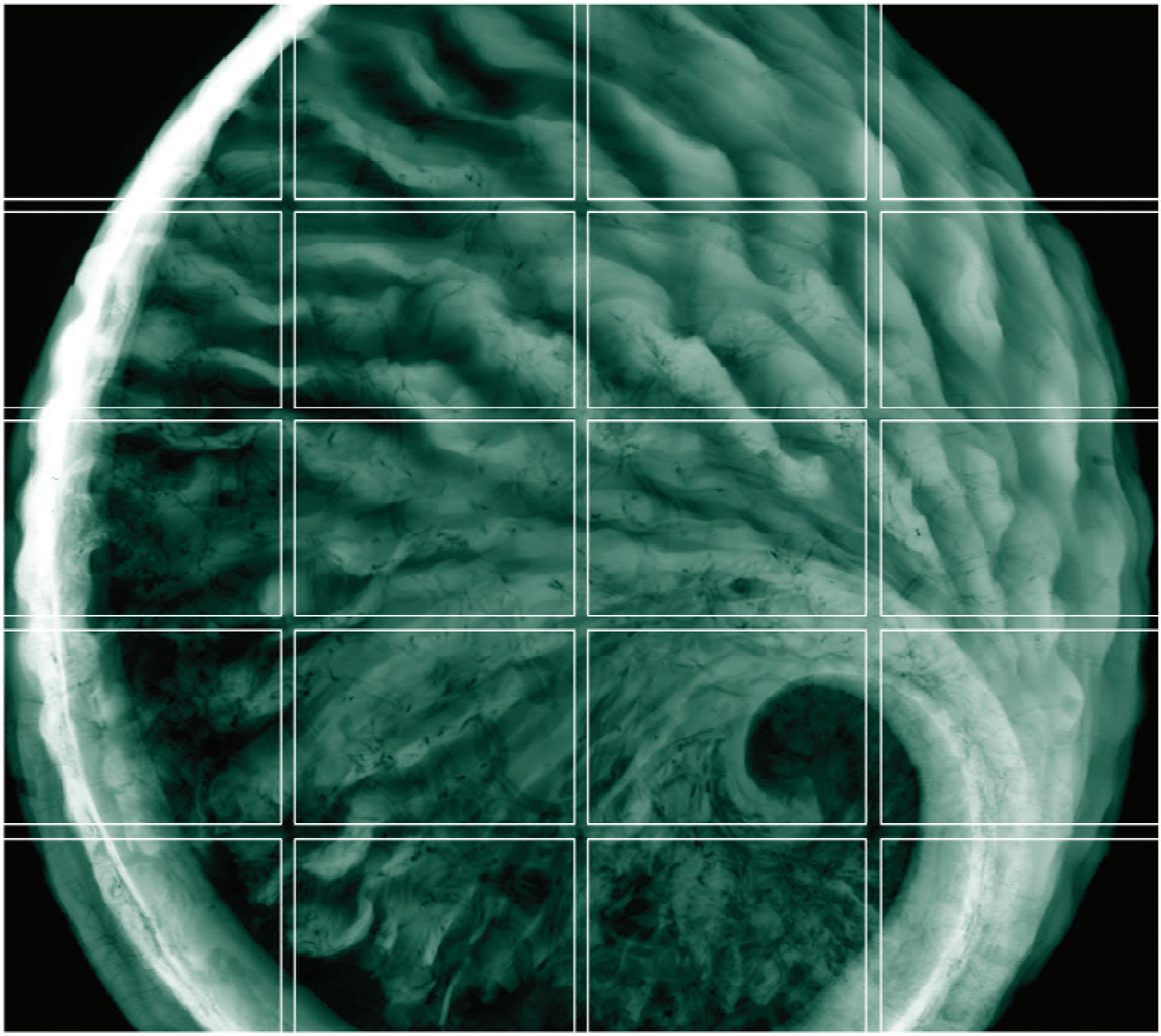
Annex C

BIRD AND BAT MONITORING STRATEGY



Paling Yards Wind Farm

Bird and Bat Monitoring Strategy

Union Fenosa Wind Australia

December 2014

20141210_PYWF_0131035_AttC

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Paling Yards Wind Farm

Bird and Bat Monitoring Strategy

Approved by:	*Matthew Flower*
Position:	Project Manager
Signed:	
Date:	*12 December 2014*
Approved by:	*Steve Laister*
Position:	Partner
Signed:	
Date:	*12 December 2014*

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CONTENTS

LIST OF TABLES

1 INTRODUCTION

This Bird and Bat Management Strategy (BBMS) identifies appropriate survey methodologies and provides guidance on bird and bat management. It outlines general guidelines on reporting and evaluation and acts to ensure that the Bird and Bat Management Plan (to be developed based on the principals outlined in this strategy) will be consistent with the following guidelines:

- AusWEA Wind Farms and Birds: Interim Standards for Risk Assessment (BL&A 2005);
- Best Practice Guidelines for the implementation of Wind Energy Projects in Australia (Clean Energy Council 2013); and
- Environment Protection and Heritage Council National Wind Farm Development Guidelines – Public Consultation Draft – October 2009.

This BBMS provides a framework that can be used for development of a detailed Bird and Bat Management Plan for the operational phase of the wind farm once approved. It outlines an indicative and adaptive program for monitoring the effects of each turbine and provides a sampling strategy specific to the first two years of operation. The details of ongoing monitoring (after the first two years of operation) will be established based on the recommendations of the initial monitoring.

1.1 AIM AND OBJECTIVES

The BBMS aims to:

- clearly identify 'at risk' bird and bat groups;
- set out monitoring requirements to assess the impact of the wind farm on local populations of birds and bats;
- outline a decision making framework and a range of feasible and practical mitigation/management actions; and
- setting out reporting requirements.

The objectives of the detailed Bird and Bat Management Plan (to be developed based on the principals outlined in this strategy) will be to:

- monitor local populations of birds and microbats, including utilisation of habitat within the wind farm area and mortalities as a result of collision with turbine blades;

- monitor behaviour of local bird and microbat populations in relation to their interaction with the wind farm, including avoidance behaviour around turbines;

- monitor natural and human changes in the environment surrounding the wind farm;

- analyse and assess the impact of the wind farm upon local bird and microbat populations;

- provide a mechanism to identify trigger points or thresholds for a management response;

- utilise an adaptive management approach to identify and implement appropriate management actions and strategies to reduce impacts as necessary; and

- monitor and evaluate the effectiveness of such measures.

2 OVERVIEW OF BIRD AND BAT SITE UTILIZATION

2.1 MICROBATS RECORDED WITHIN THE SITE

Based on the field surveys to date and as reported by ERM (2013), 12 microbat species (see *Table 2.1*) were identified with varying levels of confidence. This included three threatened species, none of which were a definite identification (for more information on the survey results refer to ERM 2013).

Table 2.1 ***Bat Species Recorded***

Scientific Name	Common Name	Status TSC Act[1]	Status EPBC Act[2]	Forage behaviour[3]	Tree Roosting
Chalinolobus gouldi	Gould's Wattled Bat	-	-	Within canopy and sub canopy, selecting for gaps in the canopy. May also be attracted to turbine lighting.	Yes
Chalinolobus morio	Chocolate Wattled Bat	-	-	Below the canopy	Yes
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Flight pattern is high and fast and they forage within or just below the tree canopy	Yes
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V	-	Forages above and below the canopy.	No
Nyctophilus species (N. gouldi or *geoffroyi)*	Lesser Long-eared Bat or Gould's Long-eared Bat	-	-	Both species forage below canopy and often close to the ground (2-5m).	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Flies slowly along forest edges and or streams.	Yes
Scotorepens orion	Eastern Broad-nosed Bat	-	-	Within the canopy.	Yes
Tadarida australis	White-striped Freetail-bat	-	-	Above canopy.	Yes
Vespadelus darlingtoni	Large Forest Bat	-	-	Below canopy, within canopy and forest floor.	Yes
Vespadelus species (*V. vulturnus* or *regulus*)	Little Forest Bat or Southern Forest Bat	-	-	Both species forage below canopy.	Yes

1. TSC = NSW Threatened Species Conservation Act
2. EPBC = Commonwealth Environment Protection and Biodiversity Conservation Act
Note that for the status listed above under both Acts, V – Vulnerable
3. Menhorst and Knight (2001) or OEH (2014) Threatened Species Profiles

Those species that forage above the canopy (see *Table 2.1*) have been identified as 'at risk' species as they may be susceptible to rotor strike and/or barotrauma. Tree roosting species may mistake turbines for a roost, also making them susceptible to impact.

2.2 *BIRDS RECORDED WITHIN THE SITE*

A total of 125 birds were recorded in May 2013 (as reported by ERM 2013, with the most abundant being the Australian Raven (*Corvus coronoides*), Australia Magpie (*Cracticus tibicen*) and the Wedge-tailed Eagle (*Aquila audax*). Two threatened species were recorded: Flame Robin and the Scarlet Robin (see *Table 2.2*).

Table 2.2 Bird Species Recorded

Common Name	Scientific Name	Status TSC Act	Status EPBC Act	Likely to Fly at RSA Height?
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	-	-	No
Grey Teal	*Anas gracilis*	-	-	No
Pacific Black Duck	*Anas superciliosa*	-	-	No
Australasian Pipit	*Anthus novaeseelandiae*	-	-	No
Wedge-tailed Eagle	*Aquila audax*	-	-	Yes
Hardhead	*Aythya australis*	-	-	No
Sulphur-crested Cockatoo	*Cacatua galerita*	-	-	Yes
Muscovy Duck*	*Cairina moschate**	-	-	No
Australian Wood Duck	*Chenonetta jubata*	-	-	No
White-winged Chough	*Corcorax melanorhamphos*	-	-	No
White-throated Treecreeper	*Cormobates leucophaea*	-	-	No
Australian Raven	*Corvus coronoides*	-	-	Yes
Pied Butcherbird	*Cracticus nigrogularis*	-	-	No
Australian Magpie	*Cracticus tibicen*	-	-	Yes
Black Swan	*Cygnus atratus*	-	-	No
Laughing Kookaburra	*Dacelo novaeguineae*	-	-	No
Emu	*Dromaius novaehollandiae*	-	-	No
White-faced Heron	*Egretta novaehollandiae*	-	-	No
Black-shouldered Kite	*Elanus axillaris*	-	-	Yes
Galah	*Eolophus roseicapillus*	-	-	Yes
Brown Falcon	*Falco berigora*	-	-	Yes
Nankeen Kestrel	*Falco cenchroides*	-	-	Yes
Eurasian Coot	*Fulica atra*	-	-	No
Magpie-lark	*Grallina cyanoleuca*	-	-	No
Welcome Swallow	*Hirundo neoxena*	-	-	No
Superb Fairy-wren	*Malurus cyaneus*	-	-	No
Noisy Miner	*Manorina melanocephala*	-	-	No
Little Pied Cormorant	*Microcarbo melanoleucos*	-	-	No
Jacky Winter	*Microeca fascinans*	-	-	No
Scarlet Robin	*Petroica boodang*		V	No
Flame Robin	*Petroica phoenicea*		V	No

Common Name	Scientific Name	Status TSC Act	Status EPBC Act	Likely to Fly at RSA Height?
Common Bronzewing	*Phaps chalcoptera*	-	-	No
Crimson Rosella	*Platycercus elegans*	-	-	Possible
Eastern Rosella	*Platycercus eximius*	-	-	Possible
Willie Wagtail	*Rhipidura leucophrys*	-	-	No
Pied Currawong	*Strepera graculina*	-	-	No
Common Starling*	*Sturnus vulgaris**	-	-	No
Australasian Grebe	*Tachybaptus novaehollandiae*	-	-	No
Banded Lapwing	*Vanellus tricolor*	-	-	No
Masked Lapwing	*Vanellus miles*	-	-	No

The majority of birds were observed flying short distances between trees and then perching. Often the peak activity was on arrival to site when birds were flushed from the immediate area into the surrounding trees. The majority of birds were observed individually or in small groups. The majority of birds recorded were seen to hug the contours and rarely flying directly above ridge tops where the turbines are proposed (ERM 2013).

Few birds were recorded flying at RSA height. The Sulphur-crested Cockatoo, Australian Magpie and Australian Raven were recorded infrequently flying close to the lower limit of RSA height at between 25m and 35m.

Wedge-tailed Eagles were recorded across the study area flying at RSA height and were observed soaring at a range of heights from 10m to over 250m. The species is not likely to be restricted to particular habitat types and were observed using ridges and hills within the Development Footprint to gain altitude, before moving away and exhibiting foraging behaviour over the surrounding forested areas (ERM 2013).

Those species likely to fly at RSA height (*Table 2.2*) have been identified as 'at risk' species as they may be susceptible to rotor strike and/or avoidance behaviours.

3 *SUMMARY OF POTENTIAL IMPACTS*

The potential impacts of wind turbines on birds and bats have been detailed within the Supplementary Ecology Report (SER) (ERM 2013). The main potential impacts on both bird and bat species from an operational wind farm are:

- direct mortality associated with rotor collisions and collisions with other associated infrastructure including towers, guy wires and transmission lines; and

- indirect impacts relating to habitat loss through the effects of installation of wind farm facilities.

As described by ERM (2013), collision risk for birds depends on a wide range of factors as summarised below:

- high collision rates are particularly evident for large soaring raptors, near areas used by large numbers of roosting or foraging birds, migratory flyways or local flight paths or areas with high bird use. No large concentrations of birds were recorded in the Study Area and the area is not known to form part of any significant migratory routes for large numbers of birds. Wedge-tailed Eagles were frequently observed within the Study Area, soaring at RSA height and may be susceptible to rotor strike; and

- bird collision risk may vary on a seasonal basis due to bird migration or breeding. No birds were recorded exhibiting direct movement at height and no birds listed as Migratory under the EPBC Act were recorded although it is recognised that birds that may visit the Study Area in some years based on spatial and temporal flowering patterns and other resource availability.

Several hypotheses have been suggested in an attempt to determine how and why bats are killed by wind turbines (BL&A 2011). These include:

- sensory failure where bats are unable to visually or acoustically detect moving turbine blades (non-echo locating bats are less able to avoid collision);

- roost attraction where bats may mistake turbines for a roost;

- acoustic attraction where bats are attracted to sounds generated by turbines;

- insect concentration such that bats are attracted to lit areas such as wind farms because of higher insect activity;

- food resources, in that wind farms tend to be built in areas where insects are concentrated (eg hilltops and ridges), thus in prime foraging habitat for bats. Open spaces around turbines may also create favourable foraging habitats; and

- decompression – sudden changes in air pressure created by turbine turbulence which can cause barotraumas in some species (BL&A 2011).

In Australia, bats display some migratory behaviour but migrations are local and not considered to cover significant distances (BL&A 2011). Hull and Cawthen (2012) found that high-flying, open-air foraging bats are more at risk of fatality at wind turbines than other species. Males and females were impacted similarly, but there was a predominance of adults suggesting that the Tasmanian Windfarms were not resulting in mortality of dispersing juveniles and sub-adults.

Based on the data available it is unlikely that the impacts to birds and bats would be significant at a population scale and there may be opportunities for the Bird and Bat Monitoring Plan developed as part of this Project to contribute to the understanding of interactions between birds/bats and turbines in an Australian context.

4 PRE-CONSTRUCTION MONITORING PROGRAM

Monitoring during the pre-construction period and comparison of the results against detailed baseline data (pre-construction monitoring) allows for:

- refinement of prediction methods;
- allows regulatory compliance monitoring (eg whether a project is fulfilling the terms of its approval by planning authorities); and
- permits proponents to monitor their own environmental performance and to adaptively manage the operation of the wind farm to minimise risk.

Monitoring involves repeated surveys, the data from which can be used to detect trends over time (Gregory *et al*. 2004). Two types of survey would be undertaken to provide the baseline data. The purpose of each survey is provided in *Figure 4.1*.

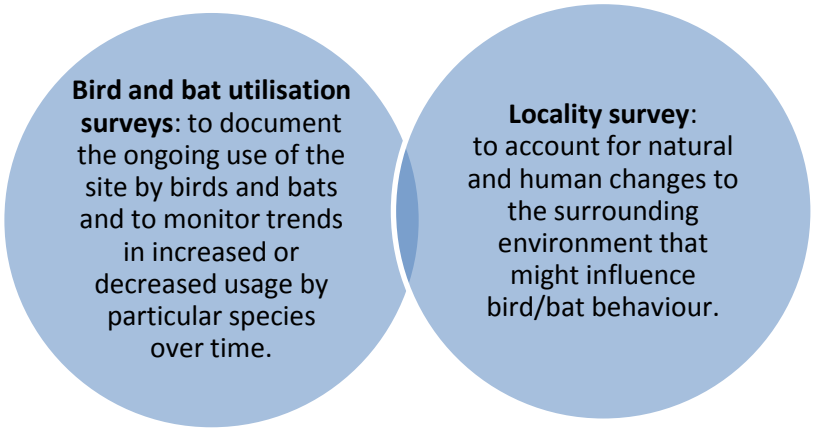

Figure 4.1: Overview of Baseline Bird and Bat Monitoring Methods

4.1 PROTOCOL FOR BIRD AND BAT UTILISATION SURVEYS

Bird Utilisation Survey

Additional seasonal baseline data would be collected over the 2015 summer, autumn, winter and spring periods using the methodology described below and in ERM (2013). Bird survey locations (x18) would be replicated as per ERM (2013). This will result in an additional 72 bird surveys over the twelve month period.

As outlined in BL&A (2005), the bird utilisation survey is the most commonly used method for generating quantitative data on bird use of a potential wind farm site. This can be used to estimate potential collision rates and provide a ranked abundance of species use of the site at varying heights.

These pre-construction surveys will supplement the data already provided in the EIS and can potentially confirm or supplement the existing data sets including:

- what bird species use the site?
- with what frequency does each species occur at the site?
- at what height do birds of each species fly? and
- what is the distribution of bird species across the site?

Bird utilisation surveys are therefore a significant component of any bird risk assessment and long term monitoring at a wind farm. The data set standards (survey methodology) as noted by BL&A (2005) and ERM (2013) are outlined below.

Data set standards (survey methodology)

- two observers stationed at a fixed survey point for a minimum of 15 minutes (up to 45 minutes), recording the abundance of all large bird species observed within 800m and all small birds within 100m. Species detection tables for appropriate time intervals within the survey period should be generated;
- the height at which each bird flies when passing through the survey area should be estimated to the nearest 20m and related back to the height of the RSA;
- the direction that each bird sighted is flying should be recorded to the nearest 45 degrees of the compass;
- to obtain a representative picture of birds on a site, each fixed point survey site should be counted during at different times of day (eg early morning, late morning, early afternoon and late afternoon) to account for diurnal differences in bird activity; and
- the number of points surveyed on a site and their locations should be selected to be representative of site conditions and consistent with the ERM 2013 survey methodology.

A suitable number of reference sites (to be determined) should be counted with the same survey effort, to provide a comparison with on-site bird usage. Reference sites are also an important component of any further pre-operational and operational phase impact monitoring. They should be between 500m and 1500m from the nearest wind turbine site, and located in similar habitats and landscape settings to the wind farm (impact) sites.

Bat Utilisation Survey

Additional seasonal baseline data would be collected over the 2015 summer, autumn, winter and spring periods using the methodology and survey effort described in ERM (2013) in order to facilitate direct comparison of pre- and post-operational data.

The Bat Utilisation Survey methodology will use static Songmeter (or similar) bat detectors to sample the echolocation calls of free-flying bats in the Study Area. Songmeter units are to be programmed to commence operation approximately 30 minutes before dusk, and to cease approximately 30 minutes after dawn and be left in the field for a minimum for three consecutive nights. Survey locations (x5) would be replicated as per ERM (2013) and will equate to at least 15 survey nights per season.

Note: No bird or bat utilisation surveys will be undertaken during the construction period of the wind farm because the data collected during this period is unlikely to be representative, due to the disturbance effect on birds and bats. However, the construction site should be checked regularly during the construction period to determine if any birds or bats have collided with partially or fully erected towers.

As outlined by the Clean Energy Council (2013), it is important that the post-construction monitoring includes:

- the identification of clear and measurable objectives;
- the development of scientifically rigorous methods that will obtain data that addresses the objectives (see *Figure 5.1*); and
- input from experts (eg ecologists and statisticians) to assist with the design and completion of surveys.

Post-construction monitoring will need to satisfy the requirements of any conditions that are placed on the wind farm by the development approval.

The indicative program provided here can be adjusted to take into consideration seasonality issues when the wind farm becomes operational so that activity levels and detectability of birds and bats are not at their lowest when sampling intensity is at its highest. For example, intensive monitoring planned for the early stages of the program would either be extended or delayed if the wind farm is commissioned in winter.

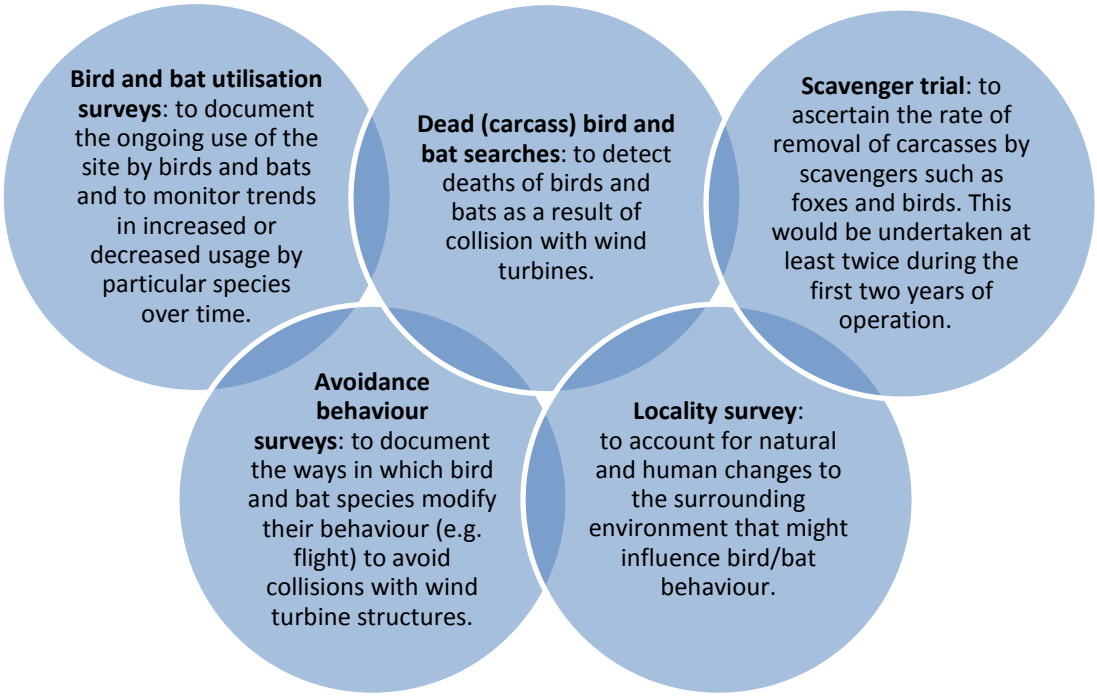

Figure 5.1: Overview of Bird and Bat Monitoring Methods (Operational Phase)

5.1 MONITORING FREQUENCY

This BBMS does not stipulate the total duration of on-ground monitoring but highlights that the program must be capable of detecting change. At this stage, the monitoring strategy is for the initial two years of operational monitoring. The frequency of monitoring events after this period would be considered in light of the results obtained throughout the program and the ongoing monitoring requirement will be negotiated with the NSW Department of Planning and Environment (DoPE).

5.2 PROTOCOL FOR DEAD (CARCASS) BIRD AND BAT SEARCHES

Carcass surveys identify the number of birds and/or bats killed per turbine over a known period of time. This value represents a minimum estimate of mortality and is adjusted for carcass removal rates (ie how quickly a carcass will decay and/or be removed by a scavenger) and searcher efficiency (ie number of carcasses present that are actually detected by the surveyor).

Three techniques are employed:

- Standardised Search: number of carcasses found around the specific turbines during peak activity periods;
- Carcass Removal Trials: monitoring of carcasses removed by scavengers to estimate the length of time that carcasses remain in the field for possible detection; and
- Searcher Efficiency Trials: percentage of carcasses found by searchers in the varying habitats throughout the wind farm facility.

Over such a large area it would not be possible to undertake a 'true census' by attempting to count all birds (or bats) within the site boundary on a weekly basis. Instead, surveys will be undertaken in a selection of representative sample areas.

Birds and bats are not distributed evenly across the landscape i.e. there are areas where habitat resources are clustered and accordingly birds and bats are more abundant in these areas. Areas where bird and bat collisions are considered more likely to occur are the 'focus areas'; the remaining areas are the 'non-focus areas' (yet to be determined – will be based on final turbine design).

The searches would involve intensive effort over a short period of time in order to gather a comprehensive dataset. For example, every turbine within the focus areas would be monitored weekly. Turbines in non-focus areas would be monitored on a rotational sampling basis.

Survey frequency and intensity would be reviewed at regular hold points (such as every three months) and a decision made as to whether survey effort should remain steady, increase or decrease.

The following strategy is recommended:

- in the first instance, searches must be centred on the turbine and should cover an area out to a distance equivalent to the height of the wind turbine for dead bird and/or bat remains and feather spots. This distance can be altered if carcass locations indicate this;

- turbines with no vegetation or sparse vegetation should be searched for a minimum of one person hour. Search times for vegetated search areas will vary, but should be slow enough to thoroughly search the area and result in high searcher efficiency;

- information on each carcass found should be recorded as follows:

    - date;
    - species;
    - signs of injury and likelihood of death due to collision;
    - signs of scavenging;
    - distance and bearing from turbine tower base; and
    - ground conditions (eg height and density of vegetation, presence of stock, etc).

- each search should involve thoroughly searching by transects within the search area. All searchers should be appropriately inducted to ensure that they understand and implement the search protocol consistently.

Evaluation would be undertaken of the stratification units and where necessary, turbines would be added or removed from focus areas. Periodic reviews would allow further evaluation where necessary.

Searchers or workers may discover bat carcasses incidental to formal searches. If these carcasses are found outside a scheduled search area they should be processed using the above protocol (eg collected, recorded, etc), and fatality data should be included with the calculation of fatality rates. If an incidentally discovered carcass is found within a search plot area, they should be photographed and their location recorded but left for the designated search team to maintain integrity of search efficiency and carcass removal rates.

5.3 PROTOCOL FOR A SCAVENGING AND SEARCHER EFFICIENCY TRIAL

5.3.1 Scavenging Trial

A scavenging trial should be undertaken at least twice over the initial (two year) monitoring period, during conditions of differing ground vegetation cover and season, to determine the rate of removal by scavenging animals. The objective of these trials is to estimate the percentage of bat and/or bird fatalities that are scavenged from study areas. Estimates of carcass removal rates will be used to adjust the number of carcasses found during surveys to correct for removal bias.

Each trial should use a minimum of 25 carcasses distributed across the range of different habitats types present. In order to avoid confusion with mortality surveys, trial carcasses should be discreetly marked with a unique identification number.

Carcasses must be placed within the surveyed area underneath turbines after sunset using gloves to avoid scents that might bias trial results (ie attract or repel scavengers) and monitored for removal every 24 hours. If possible, fresh carcasses or ones frozen for a limited amount of time should be used. The use of older/dried out carcasses may bias the results because they might not be scavenged at the same rate as fresh ones. Trials should continue until all the carcasses are removed or until the end of the carcass removal trial period (minimum 14 days).

The mean carcass persistence will be derived from the carcass persistence trials and will be used to adjust the search interval. Estimates of the probability that a carcass was not removed in the interval between searches (probability of persistence) and therefore was available to be found by searchers, will be used to adjust carcass counts for removal bias (Huso 2011).

5.3.2 Searcher Efficiency Trials

Searcher efficiency is another important factor in creating an accurate estimate of total bird and bat mortality. Searcher efficiency trails are to be conducted as part of post-construction monitoring.

Searcher efficiency trials require a known number of discreetly marked carcasses to be randomly planted around a wind turbine and their location recorded for retrieval if they are not found during the trial. Seasonality should be considered when designing searcher efficiency trials to account for potentially different scavenging rates, species, and rates of decomposition. Searchers examine the wind turbine area, and the number of carcasses detected is compared to the number of carcasses placed in the field. If searcher efficiency is low (<30%) based on initial trials then the search time should be increased, distance between transects reduced, or additional staff training should be conducted.

5.4 *PROTOCOL FOR ONGOING BIRD AND BAT UTILISATION SURVEYS*

Bird and bat utilisation surveys would be undertaken during the carcass search events, with a minimum of 18 bird and five bat surveys per month using the methodology outlined in *Section 5.2*. This would mean that each of the bird and bat utilisation survey sites (as mapped in ERM 2013) would be surveyed once each month. Survey frequency and intensity would be reviewed at regular hold points (such as every three months) and a decision made as to whether survey effort should remain steady, increase or decrease.

5.5 *PROTOCOL FOR ASSESSMENT OF INDIRECT DISTURBANCE (LOCALITY SURVEY)*

Periodic (ie every three months) locality surveys should be undertaken to document any changes in the local environment and provide a basis upon which to judge whether any observed changes in bird and/or bat behaviour can be reasonably attributable to factors other than the operation of the wind farm, including seasonal factors. The survey may include, but not be limited to, the following:

- seasonal changes, including evidence of nesting activity by key species;
- changes in land use practices;
- significant changes in water levels in nearby water bodies;
- significant weather events; and
- anecdotal information from land owners, land managers, wind farm staff and the local community.

5.6 *STUDYING AVOIDANCE BEHAVIOUR*

Avoidance behaviour includes a number of behaviours, defined by the Interim Standards (BL&A 2005) as set out below.

Avoidance involves birds and bats remaining on a wind farm site but flying around, over or under operating wind turbines and it is a commonly observed behaviour at wind farms.

Diversion involves birds and bats remaining within the area around a wind farm but avoiding the wind farm site entirely.

Displacement involved birds and bats being displaced through disturbance from the area around the wind farm.

Avoidance surveys should be undertaken in conjunction with the bird and bat utilisation surveys and should note the following:

- bird and bat species observed, heard or recorded;
- flight height & direction of bird species when first observed;
- flight behaviour (ie soaring, hovering, gliding, flapping, etc);
- any feeding buzzes (recorded using Anabat) and
- avoidance behaviour observed (eg change of flight behaviour in close proximity to turbines), if any.

6 INDICATIVE MONITORING SCHEDULE

An indicative monitoring program (schedule) has been prepared assuming commissioning of the Wind Farm in January. The calendar below provides an indication of the monitoring program stages by year and by season. The intensive monitoring planned for the early stages of the program would either be extended or delayed if the wind farm is commissioned in winter.

In order to gain an understanding of the impact of the wind farm upon local bird and bat populations, surveys must be taken across a range of seasons; particularly during periods of higher activity such as spring and summer.

Table 6.1 Indicative Monitoring Schedule – Operational

Monitoring Action	Year 1												Year 2											
	Summer			Autumn			Winter			Spring			Summer			Autumn			Winter			Spring		
Internal reporting and evaluation of survey effort (every 3 months)																								
Bird and Bat Utilisation Surveys (in conjunction with the carcass surveys)							Survey effort to be evaluated every 3 months																	
Avoidance Behaviour (in conjunction with bird and bat utilisation surveys)							Survey effort to be evaluated every 3 months																	
Dead (carcass) bird and bat searches – Focus Area (weekly)																								
Dead (carcass) bird and bat searches – Non-focus Area (weekly on rotational basis)																								
Locality Survey (every 3 months)																								
Carcass Removal Trials (at least 2 trials in different seasons)																								
Searcher Efficiency Trials (at least 2 trials in different seasons)																								
Annual Reporting																								

The details of ongoing monitoring (after the first two years of operation) will be will be negotiated with the DoPE.

7 *REPORTING*

Internal reporting should be undertaken every three months to identify any trends of concern that may trigger a management response or the need for changes in survey protocol. Triggers and performance criteria will be developed following final design of the wind farm and will be based on approval conditions and best practice guidelines.

An annual report will provide a detailed analysis of the data and should seek to answer the following questions:

- Has the species assemblage changed (presence/absence)?
- What differences in species assemblage, abundance and habitat utilisation have occurred and can these be linked to any aspect of the wind farm operation? (eg shadow flicker, noise, blade-strike);
- Are there other environmental factors that could contribute to any detected changes in species assemblage, abundance and habitat utilisation? (eg changes in surrounding landuse);
- What types of avoidance behaviours were directly observed (eg flight manoeuvres to avoid blades) and by which species?
- What types of avoidance behaviours can be inferred (eg diversion and displacement) and by which species? and
- Have there been any statistical changes in species abundance (birds) or activity levels (bats)? If yes, is there any potential for a local population level impact for a given species?

Specific details on statistical analyses to be conducted have not been provided in this Strategy as they will depend on the quality and quantity of data collected and whether data assumptions for a given statistical test can be met. As a minimum, analysis of trends is likely to include:

- raw numbers of mortalities (plotted or tabulated by turbine, month, season);
- analysis of type of species directly impacted relative to flight behaviour and any avoidance behaviour observed;
- decline in species presence when compared with pre-operational monitoring results;
- comparison of bird and bat usage (abundance and richness) before and after construction; and
- comparison of bird and bat usage (abundance and richness) over time since operation commenced.

In accordance with the Interim Standards (BL&A 2005), reports of dead bird and bat search programs should provide the following.

- a detailed account of the methods of the dead bird search program, including the total number of sites counted (turbine sites and reference sites, their locations, including coordinates, whether they represent all or randomly selected turbine sites, and whether any fixed search sites were included);

- mortality estimates should be provided for birds (in total and by species) as the number of dead birds per turbine per year, including application of correction factors for scavenging and observer efficiency;

- the estimate of mortality rates by species should be compared with any pre-operational bird utilisation survey results (at RSA height) to determine which species are at greatest risk from the wind farm;

- the estimated mortality rates should be compared with the results of the regional population assessments and population viability analyses undertaken, where relevant; and

- the requirement for continued monitoring should be reviewed, together with the monitoring methodology. The estimate of mortality rates by species should be compared with any pre-operational bird utilisation survey results (at RSA height) to determine which species are at greatest risk from the wind farm.

8 *CONCLUSION*

This Bird and Bat Management Strategy (BBMS) identifies appropriate survey methodologies and frequency, and provides guidance on bird and bat management. It provides a framework that can be used for development of a detailed Bird and Bat Management Plan for both the construction and operational phases of the wind farm once approved.

It outlines an adaptive program for monitoring the effects of each turbine and provides a sampling strategy specific to the first two years of operation. The details of ongoing monitoring (after the first two years of operation) will be negotiated and established based on the recommendations of the initial monitoring.

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Environmental Resources Management

PO Box 803
Newcastle NSW 2300
Watt Street Comercial Centre
45 Watt Street
Newcastle NSW2300

T: +61 2 49 035500
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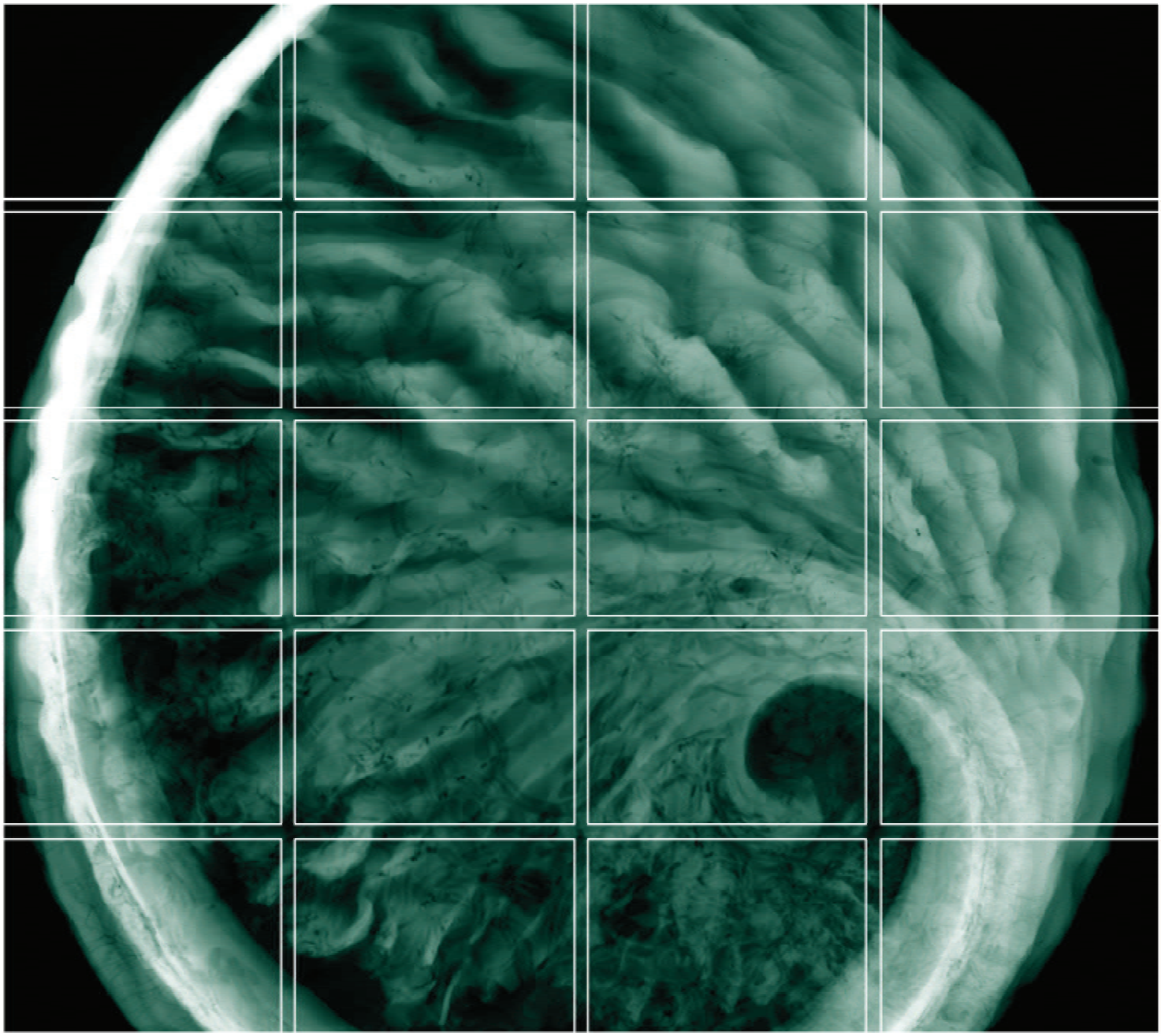
Annex D

OFFSET STRATEGY



Paling Yards Wind Farm

Biodiversity Offset Strategy

Union Fenosa Wind Australia

December 2014

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Paling Yards Wind Farm

Biodiversity Offset Strategy

Approved by:	*Matthew Flower*
Position:	Project Manager
Signed:	
Date:	*12 December 2014*
Approved by:	*Steve Laister*
Position:	Partner
Signed:	
Date:	*12 December 2014*

Union Fenosa Wind Australia Pty Ltd

December 2014

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

This Offset Strategy has been prepared as part of the response to submissions for the Paling Yards Wind Farm Environmental Assessment. It has been prepared to outline the general methods by which the Project's ecological impacts will be offset, taking account of:

- the NSW Office of Environment and Heritage (OEH) *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014);
- the principles and resources provided by the BioBanking Scheme including the BioBanking Credits Register and the BioBank sites Expressions of Interest (EOI); and
- OEH advice provided during a teleconference on 21 October 2014.

The Strategy provides a framework that can be used following project approval for the development of a detailed Offset Management Plan for the project's ecological impacts.

AIMS AND OBJECTIVES

This Offset Strategy aims to:

- provide a summary of the project's ecological impacts;
- introduce the OEH principles of biodiversity offsetting;
- identify options available to offset the project's biodiversity impacts;
- discuss the viability of options including the consideration of separation distances between impacts and offsets; and
- provide an outline of the proposed biodiversity offset.

The term 'Study Area' has been adopted from the Supplementary Ecological Report (SER) (ERM 2014) and refers to the area that was the subject of the ecological assessment, including (refer *Annex A*):

- the area within 100 metres (m) of the Development Footprint; and
- areas of potential habitat for threatened birds and bats within the Project Application Area.

BIOMETRIC VEGETATION TYPES IN THE STUDY AREA

Four Biometric Vegetation Types (BVTs) were identified in the Study Area[1], as shown in *Table 2.1.* Whilst it is inherently difficult to identify vegetation types where there has been modification by agriculture (eg the tree densities may have been reduced and grass species composition may have been altered from the pre-European condition for pasture improvement), in these cases, the biometric vegetation type most in keeping with vegetation on the ground was selected based on available site observations such as remnant tree species type present.

Table 2.1 Biometric Vegetation Types in the Study Area

BVT Code	Biometric Vegetation Type
LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
LA124	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands
LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion
LA186	River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions
ERM (2014)	

Condition classes were applied to each of the BVTs mapped in the Study Area to create 'Vegetation Zones' (see ERM 2014 for more details). The vegetation zones present in the Study Area and their area within the Development Footprint are shown in *Table 2.2* and *Annex A.* Full vegetation descriptions are provided in the SER (ERM 2014).

[1] The term 'Study Area' has been adopted from the Supplementary Ecological Report (SER) (ERM 2014) and refers to the area that was the subject of the ecological assessment, including (refer *Annex A*):

- the area within 100 metres (m) of the Development Footprint; and
- areas of potential habitat for threatened birds and bats within the Project Application Area.

Table 2.2 Type of Vegetation Zone in the Study Area and Area within Development Footprint

BVT Code	Vegetation Zone	Area in Development Footprint (ha)	Equivalent Endangered Ecological Community Type
LA103_MG_PG	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands_Moderate-Good (Mod-Good)_Poor-Grassland	2.9	Box Gum Woodland occurring as Derived Native Grassland (TSC Act)
LA124_MG_M	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Mod	6.9	None
LA124_MG_PG	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Poor-Grassland	0.0	None
LA124_MG_Shrubby	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Shrubby	2.3	None
LA182_MG_M	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Mod	1.4	None
LA182_MG_Shrubby	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Shrubby	0.2	None
LA186_MG_PW	River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions_Mod-Good_Poor-Weedy	0.3	None
Total		**14.0**	

1. The BVT Code is provided here with a suffix which is an abbreviation of the condition class
2. Sections of the development footprint include areas of existing cleared farm track, covering approximately 0.4 ha.

1.1 PROPOSED DEVELOPMENT IMPACTS

The Project comprises a number of components, permanent and temporary, that would impact on ecological values. Those project components that were accounted for in calculations of the impacts of the project on ecological values as provided in the SER (ERM 2014) are listed in *Table 2.3* and discussed further in the following sections.

Table 2.3 Project Components

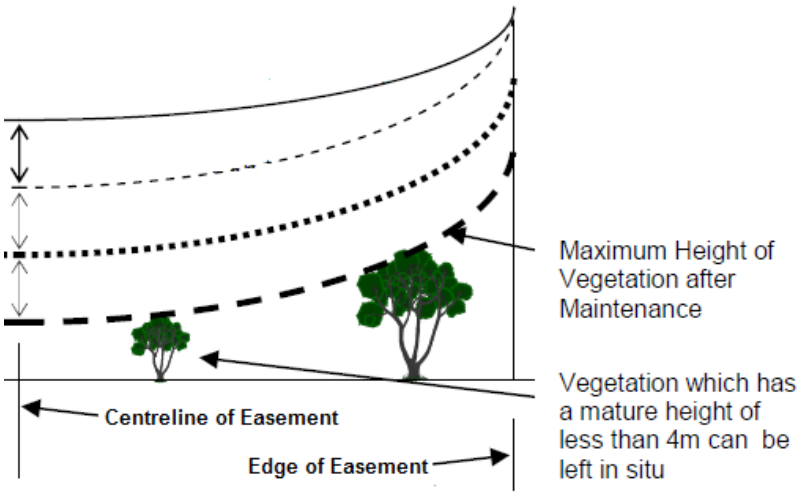
Project Component	Number	Maximum Dimensions
Permanent		
Wind Turbine Generators (WTG)	Up to 55	20m x 20m
Access tracks	-	6m wide x 26.04km
Substations	2	250m x 210m
Transmission lines (including power poles)	-	60m wide x 9000m*
Wind monitoring mast footings	Up to 3	$6m^2$
Crane pads at WTGs	Up to 55	50m x 50m
Temporary		
Construction access tracks	-	10m wide x 26.04km
Batching plant	1	80m x 80m
Construction disturbance areas	-	2m around the footprint of each WTG, crane pad, batching plant and monitoring tower

*This length indicated in this table includes both sub-options of the northern transmission line, of which only one will be selected.

1.1.1 Native Vegetation

The Development Footprint covers a total area of 106.5 hectares (ha). This includes a permanent impact area of 33.1ha, temporary impact area of 13.0ha and 60.4ha of limited impact associated with the northern transmission line option. The 60.4ha associated with establishment of the northern transmission line option would not require clearance of all vegetation within the identified corridor as this may be achieved through limiting clearing to vegetation at each power pole structure and for establishment of an access track within the easement. Outside of the power pole locations, vegetation up to four metres in height would remain and vegetation up to 15m in height at the edges of the easements would remain (see *Figure 2.1*).

Figure 2.1 Vegetation Clearance within the Transmission Line Easement



Source: ERM (2014)

Of the total Development Footprint, 92.5ha comprises exotic pasture, cropping, planted vegetation or bare ground. The remaining 14.0ha comprises native vegetation, as shown in *Table 2.4*. *Table 2.4* also provides a breakdown of areas for both permanent and temporary impacts for each BVT.

Table 2.4 Area of Each Vegetation Zone in Development Footprint

BVT Code[1]	Vegetation Zone	Area in Study Area (ha)	Total Area in Development Footprint (ha) (including transmission line)	Permanent Impact Area (ha)	Temporary Impact Area (ha)	Partial Clearance (transmission line) (ha)
LA103_MG_PG	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands_Mod-Good_Poor-Grassland*	21.9	2.9	1.9	1.0	0.0
LA124_MG_M	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Mod	47.0	6.9	0.1	0.0	6.8
LA124_MG_PG	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Poor-Grassland	11.2	0.0	0.0	0.0	0.0
LA124_MG_Shrubby	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands_Mod-Good_Shrubby	11.7	2.3	0.0	0.0	2.3
LA182_MG_M	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Mod	23.1	1.4	1.0	0.4	0.0
LA182_MG_Shrubby	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion_Mod-Good_Shrubby	1.0	0.2	0.2	0.0	0.0
LA186_MG_PW	River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions_Mod-Good_Poor-Weedy	1.2	0.3	0.0	0.0	0.3
	Total	**117.1**	**14**	**3.2**	**1.4**	**9.4**

1. The BVT Code is provided here with a suffix which is an abbreviation of the condition class

2 * indicates this vegetation forms part of the TSC Act-listed Box Gum Woodland EEC occurring in the Study Area and Development Footprint as Derived Native Grassland.

Source: ERM (2014)

Offset Measures

The vegetation zone areas used in the BioBanking assessment are based on the permanent Development Footprint and the northern transmission line option (which includes two options for a short section of which the southern sub-option has been used) (see *Table 2.4*).

The indicative area of offset that was calculated using the BioBanking Assessment Methodology (BBAM) and the credit to hectare converter is shown in *Table 2.5*.

Table 2.5 Credit requirements and their equivalent in hectares

BVT Code	BVT name	Area in Permanent Footprint and Transmission Line Southern Sub-Option (ha)	Required Credits	Equivalent Hectares required
LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	1.9	36	3.9
LA124	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	9.2	181	19.5
LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion	1.2	66	7.1
LA186	River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions	0.3	6	0.6
	Total	**12.6**	**289**	**31.1**

1. Data is based on the Credit Report provided in Annex B and the BioBanking Credit Converter

PROPOSED OFFSET STRATEGY

OEH BIODIVERSITY OFFSETS POLICY FOR MAJOR PROJECTS

In mid-2014 OEH released a biodiversity offsets policy for major projects. This is in a transitional phase. There are six principles underpinning the biodiversity offsets policy (OEH 2014).

- Principle 1: Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts;
- Principle 2: Offset requirements should be based on a reliable and transparent assessment of losses and gains;
- Principle 3: Offsets must be targeted to the biodiversity values being lost or to higher conservation priorities;
- Principle 4: Offsets must be additional to other legal requirements;
- Principle 5: Offsets must be enduring, enforceable and auditable; and
- Principle 6: Supplementary measures can be used in lieu of offsets.

OFFSET OPTIONS

A number of options exist through which a biodiversity offset can be achieved. These include:

- BioBanking Credits through the formal use of the BioBanking system that involves the purchase of credits to offset the calculated impacts. The credits are generally available for purchase from a landholder who has undertaken investigations and quantification of the ecological value of their land and created them for sale;
- Land contribution to existing conservation lands where in negotiation with the NSW National Parks and Wildlife Service (NPWS), a landholder can turn over a piece of what is currently privately owned land to the ownership and control of the NPWS. The appropriate land must be negotiated with the NPWS and is likely to be a piece of land adjacent to a national park that is of strategic value to the NPWS for regional ecological value. A third party (ie Union Fenosa Wind Australia) could work with a private landholder to assist this piece of land to be made available. The land would then come under the ownership of NPWS; and
- Voluntary conservation agreements whereby a private landholder can set aside a piece of land to be managed in a manner that will enhance the biodiversity values of that piece of land. This is similar to the concepts of BioBanking, however the rules governing the offset site may be less

stringent than those for BioBanking. The piece of land will need to be set aside and managed for conservation in perpetuity.

AVOIDANCE OF INDIRECT IMPACTS

During the teleconference on 21 October 2014, OEH raised the issue of the separation distance between an offset site and the proposed wind farm infrastructure. The distance between the offset site and the nearest wind turbine must be sufficient so that the ecological values of the offset site are not influenced by the wind turbines. OEH provided guidance on 31 October 2014 by email that a desirable separation distance is about 1km.

PROPOSED OFFSET

It is anticipated that Union Fenosa Wind Australia will adopt the voluntary conservation agreement path, and work with a private landholder to have the landholder manage a suitable area of land for conservation. The location, management actions and other associated specific detail guiding the management of the Paling Yards biodiversity offset will be detailed in an *Offset Management Plan* that will be prepared should the proposed Paling Yards Wind Farm be approved and construction is to go ahead. The extent of the offset will satisfy the *NSW Biodiversity Offsets Policy for Major Projects* (refer *Section 3.1*) to the satisfaction of OEH.

This section outlines the proposed location options identified at this stage, that will subsequently be subject to the appropriate level of ecological investigation to determine their suitability as offset areas (to be determined through quantification of the ecological values present and in liaison with OEH to confirm their suitability). It then provides examples of management actions that could be used if necessary to enhance the biodiversity of the offset site, the offset security and outlines the funding arrangement that could be used.

PROPOSED OFFSET LOCATION

Three options have been initially identified for the proposed offset location within the project site boundary, in consultation with the host landowner. The specific vegetation types contained in these marked areas will be investigated as part of the offset identification process. All three options are close to the locations of the impacts, and although the separation distance between the nearest turbines and the nearest edge of the proposed offset areas are less than the recommended 1km separation distance, the centre of options 1 and 3 are approximately 1km from the nearest turbine. Selection of the appropriate offset site will seek to maximise the separation distances, along with considerations of other parameters of ecological suitability (ie presence of the required or suitable vegetation types, condition of the vegetation and proposed management measures that could be employed). The following is a summary of each location (see *Annex C* for the locations):

Region 1:

- Total area of region is approximately 112ha;
- This region is adjacent to the Abercrombie River National Park;
- Closest turbine tower (P40) to centre of region is approximately 1,000m;
- Closest turbine tower (P40) to edge of eastern boundary of region is approximately 600m;

- Closest turbine tower (P37) to edge of south-eastern boundary of region is approximately 600m; and
- Closest turbine tower (P35) to edge of southern boundary of region is approximately 600m.

Region 2:

- Total area of region is approximately 43ha;
- This region is adjacent to the Abercrombie River National Park;
- Closest turbine tower (P31) to edge of north-eastern boundary of region is approximately 600m;
- Closest turbine tower (P20) to edge of eastern boundary of region is approximately 670m;
- Closest turbine tower (P14) to edge of south-eastern boundary of region is approximately 630m; and
- Closest turbine tower (P10) to edge of southern boundary of region is approximately 750m.

Region 3:

- Total area of region is approximately 44ha;
- This region is adjacent to another land area under a conservation agreement;
- Closest turbine tower (P15) to edge of north-eastern boundary of region is approximately 600m;
- Closest turbine tower (P8) to edge of north-western corner of region is approximately 860m; and
- Closest turbine tower (P15) to centre of region is approximately 950m.

Should none of these three options be identified as suitable to be used as an offset for the project, further investigations will be undertaken by Union Fenosa Wind Australia of alternative land areas on the properties near the proposed development and, where possible, adjoining the Abercrombie River National Park. Other alternatives may include using the BioBanking system to secure credits equivalent to the project impacts.

Management Strategy for the Offset

The main aim of management actions at the offset site will be to improve the biodiversity values at the site. These actions will typically be more onerous at the instigation of the offset site and reduce over time, however it is important to note that they will be required in perpetuity. Such management actions may include: Fencing to exclude stock;

- fencing to exclude feral animals;
- feral animal removal;
- weed removal;
- controlled burning;
- revegetation; and
- erosion control.

The management action plan will detail the specific actions required and their timing/frequency, and will also include a recommended monitoring and auditing program to measure the improvements in biodiversity values at the site and provide an opportunity to make improvements to the management actions.

Security of the Site

It is proposed that the offset site will be secured through a Voluntary Conservation Agreement between the landholder and the NSW Government.

Funding Arrangements

It is proposed that the management actions will be financed through the provision of funds from Union Fenosa Wind Australia on an annual basis for management actions and landuse compensation, in accordance with agreements between Union Fenosa Wind Australia and the landholder.

REFERENCES

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Annex A

Figures

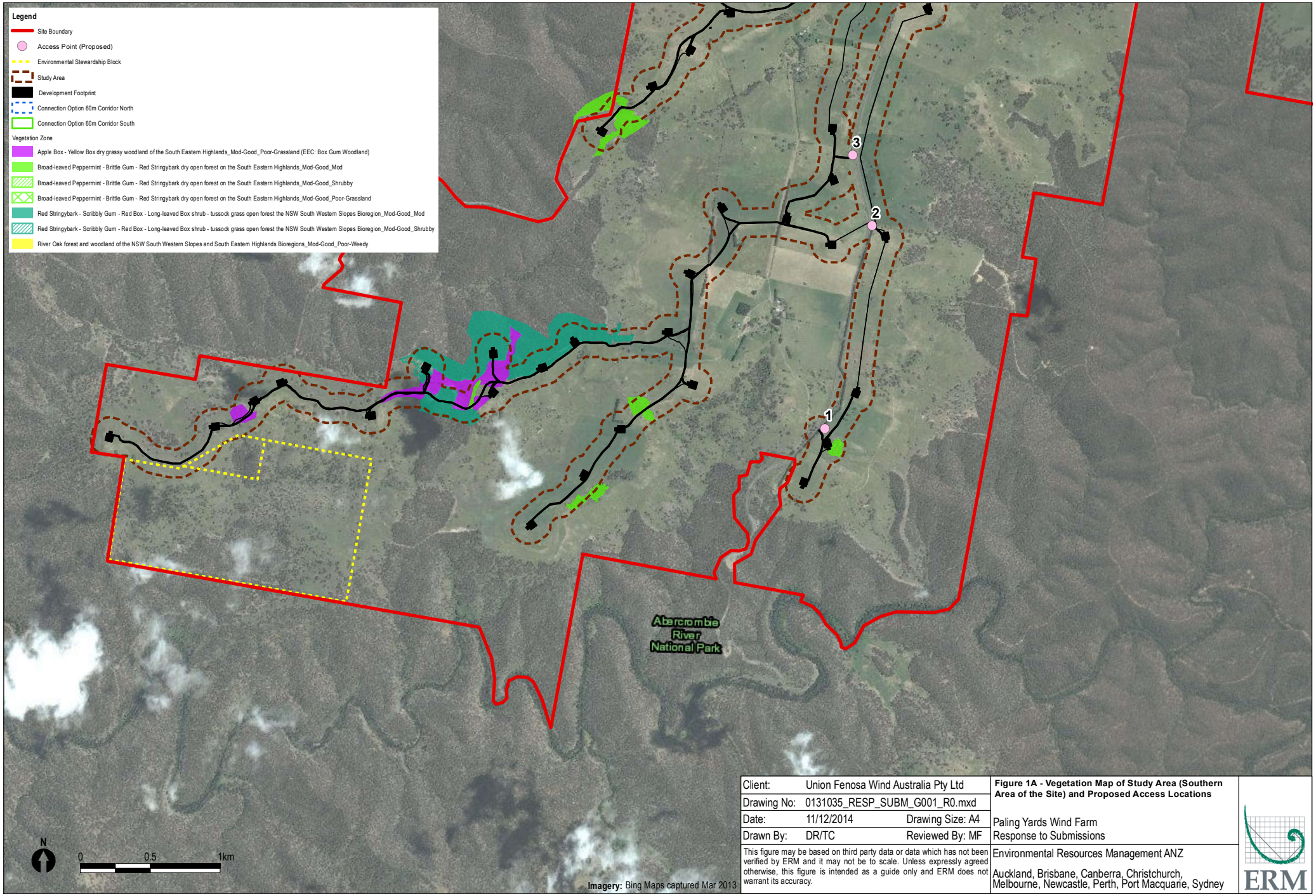

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Figure 1A - Vegetation Map of Study Area (Southern Area of the Site) and Proposed Access Locations

Paling Yards Wind Farm
Response to Submissions

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

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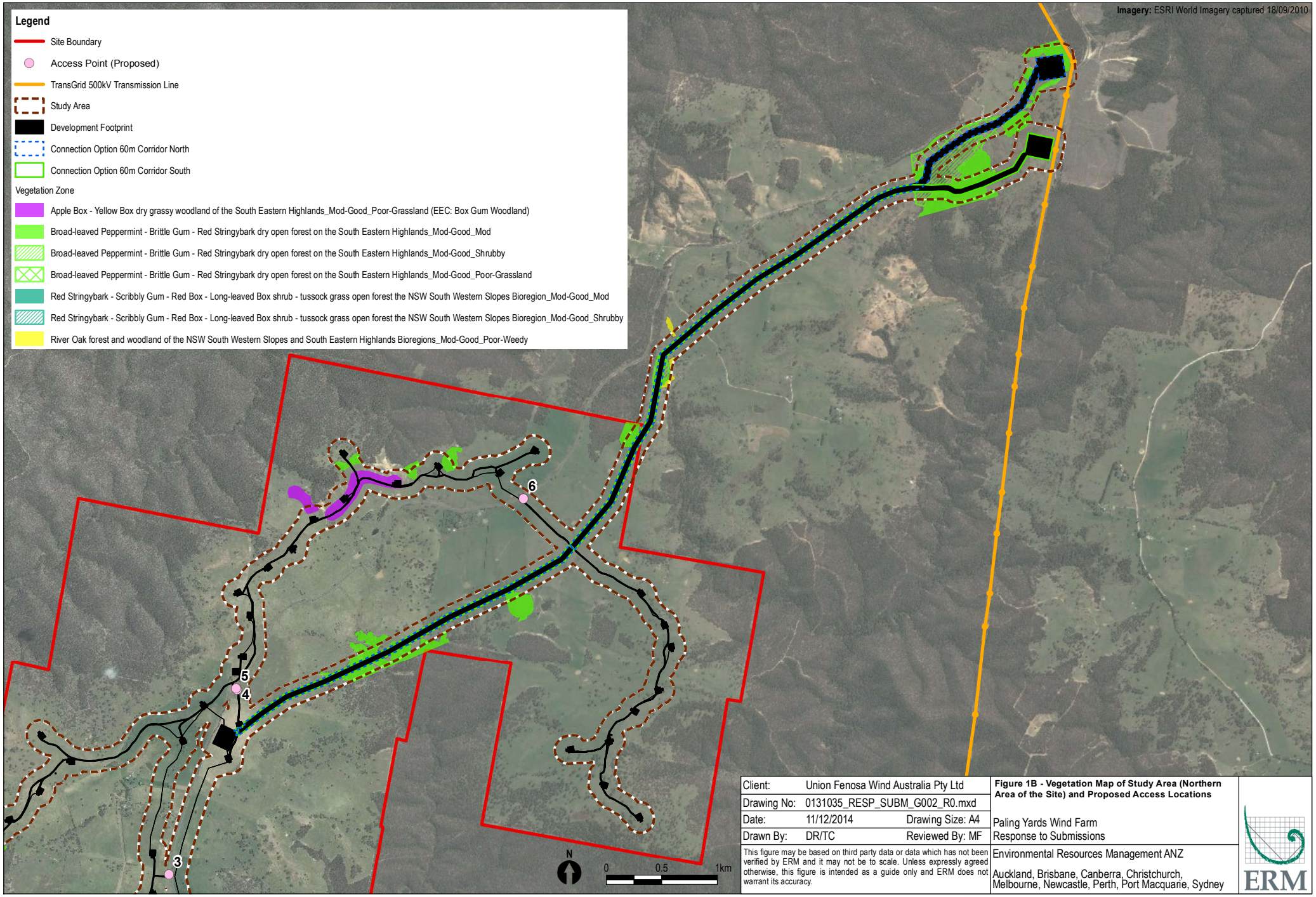

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Figure 1B - Vegetation Map of Study Area (Northern Area of the Site) and Proposed Access Locations

Paling Yards Wind Farm
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Annex B

BioBanking Credit Report

BioBanking Credit Calculator

Ecosystem credits

Proposal ID :	0089/2013/0733D
Proposal name :	Paling Yards Wind Farm
Assessor name :	Evelyn Craigie
Assessor accreditation number :	0089
Tool version :	1.1
Report created :	03/06/2013 16:11

Assessment circle name	Landscape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
AC1	12.00	LA103_Moderate/Good_Poor	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Moderate/Good_Poor	Yes	Hardstand	1.90	11.46	0.00	11.46	11	36	Spotted-tailed Quoll	22.22	0.35	36
AC1	12.00	LA124_Moderate/Good_Medium	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate/Good_Medium	No	Hardstand	0.10	42.71	0.00	42.71	1	0		0.00	0.00	1
AC1	12.00	LA124_Moderate/Good_Medium	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate/Good_Medium	No	Powerline	6.80	42.71	10.94	31.77	74	155	Spotted-tailed Quoll	27.77	0.35	155
AC1	12.00	LA124_Moderate/Good	Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	Moderate/Good	No	Powerline	2.30	38.19	15.80	22.39	20	25	Spotted-tailed Quoll	11.11	0.35	25
AC1	12.00	LA182_Moderate/Good_Medium	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	Moderate/Good_Medium	No	Hardstand	1.20	51.04	0.00	51.04	19	66	Spotted-tailed Quoll	72.22	0.35	66
AC1	12.00	LA186_Moderate/Good_Poor	River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions (Benson 85)	Moderate/Good_Poor	Yes	Powerline	0.30	49.48	18.75	30.73	3	6	Squirrel Glider	33.33	0.45	6

BioBanking Credit Calculator

Species credits

Proposal ID :

Proposal name :

Assessor name :

Assessor accreditation number :

Tool version : 1.1

Report created : 03/06/2013 16:11

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
			No					

BioBanking Credit Calculator

BioBanking credit report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 3/06/2013 Time: 4:13:01PM Tool version: 2.0

Development details

Proposal ID:	0089/2013/0733D
Proposal name:	Paling Yards Wind Farm
Proposal address:	Abercrombie Rd Paling Yards NSW 2580
Proponent name:	Union Fenosa Wind Australia Pty Ltd
Proponent address:	Suite 403, 68 York St Sydney NSW 2000
Proponent phone:	02 82978700
Assessor name:	Evelyn Craigie
Assessor address:	Buidling C, 33 Saunders Street PYRMONT NSW 2009
Assessor phone:	8586 8719
Assessor accreditation:	0089

Improving or maintaining biodiversity

An application for a red flag determination is required for the following red flag areas

Red flag	Reason
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions (Benson 85)	Vegetation type being > 70% cleared; or it contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in the BioBanking Assessment Methodology. Please note that a biobanking statement cannot be issued unless the determination is approved.

Additional information required for approval:

- ☐ Change to percent cleared for a vegetation type/s
- ☐ Use of local benchmark
- ☐ Change negligible loss
- ☐ Expert report
- ☐ Predicted threatened species not on site
- ☐ Change threatened species response to gain (Tg value)

Ecosystem credits summary

Vegetation type	Area (ha)	Credits required	Red flag
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	0.10	1	No
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	6.80	155	No
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	1.90	36	Yes
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands	2.30	25	No
Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290)	1.20	66	No
River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions (Benson 85)	0.30	6	Yes
Total	12.60	289	

Credit profiles

1. Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands, (LA103)

Number of ecosystem credits required	36
CMA sub-region	Crookwell - Lachlan
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands, (LA103) Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands, (CW102) Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (Benson 277), (CW112)	Crookwell - Lachlan Upper Slopes - Central West

2. Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290), (LA182)

Number of ecosystem credits required	66
CMA sub-region	Crookwell - Lachlan
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions

Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (Benson 290), (LA182) Broad-leaved Stringybark - Mountain Ribbon Gum - Messmate open forest of escarpment ranges of the North Coast and New England Tablelands, (HU518) Red Stringybark - Red Box - Long-leaved Box - Scribbly Gum shrub - tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion (Benson 290), (MU573)	Crookwell - Lachlan Wollemi (Part A) Wollemi - Central West Capertee Bathurst - Central West Hill End Orange - Lachlan Yengo - Hunter/Central Rivers Cumberland - Sydney Metro Wyong Walcha Plateau - Northern Rivers Armidale Plateau Rocky River Gorge Northeast Forest Lands - Northern Rivers Tenterfield Plateau Kerrabee - Central West Hunter Liverpool Range - Central West Liverpool Range - Namoi Peel - Namoi Upper Slopes - Lachlan Upper Slopes - Central West Stanthorpe Plateau

3. Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands, (LA124)

Number of ecosystem credits required	181
CMA sub-region	Crookwell - Lachlan
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	**Offset options - CMA sub-regions**
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands, (LA124)	Crookwell - Lachlan Wollemi (Part A) Wollemi - Central West Capertee

	Bathurst - Central West Hill End Orange - Lachlan Yengo - Hunter/Central Rivers Cumberland - Sydney Metro Wyong Walcha Plateau - Namoi Walcha Plateau - Northern Rivers Armidale Plateau Rocky River Gorge Oberon - Central West Eastern Nandewars Murrumbateman - Murrumbidgee Bondo Bondo (Part A) Bondo (Part B) Wongwibinda Plateau Nightcap Northeast Forest Lands - Northern Rivers Tenterfield Plateau Kerrabee - Central West Hunter Liverpool Range - Central West Liverpool Range - Namoi Peel - Namoi Upper Slopes - Lachlan Upper Slopes - Central West Stanthorpe Plateau

4. River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions (Benson 85), (LA186)

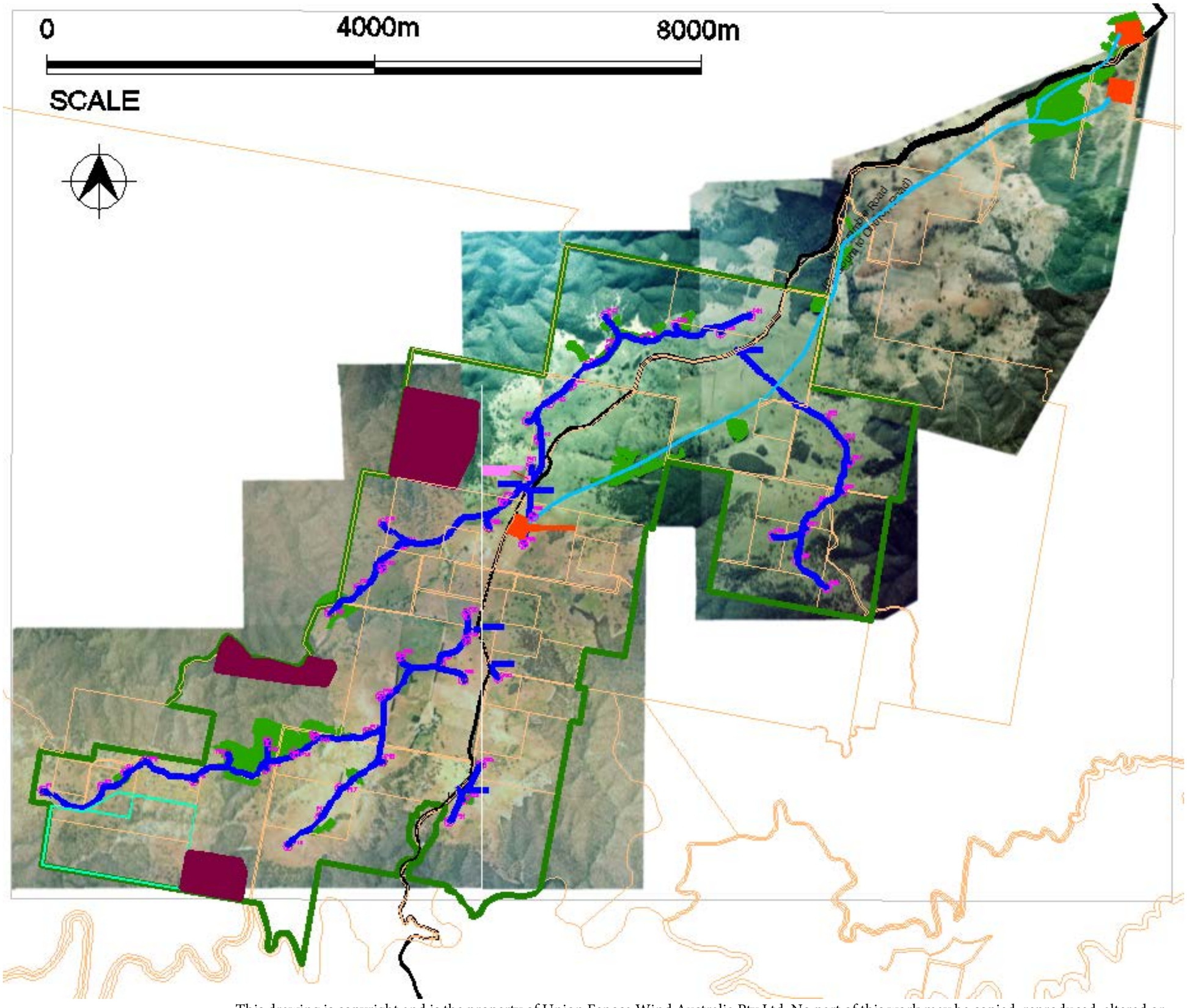
Number of ecosystem credits required	6
CMA sub-region	Crookwell - Lachlan
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

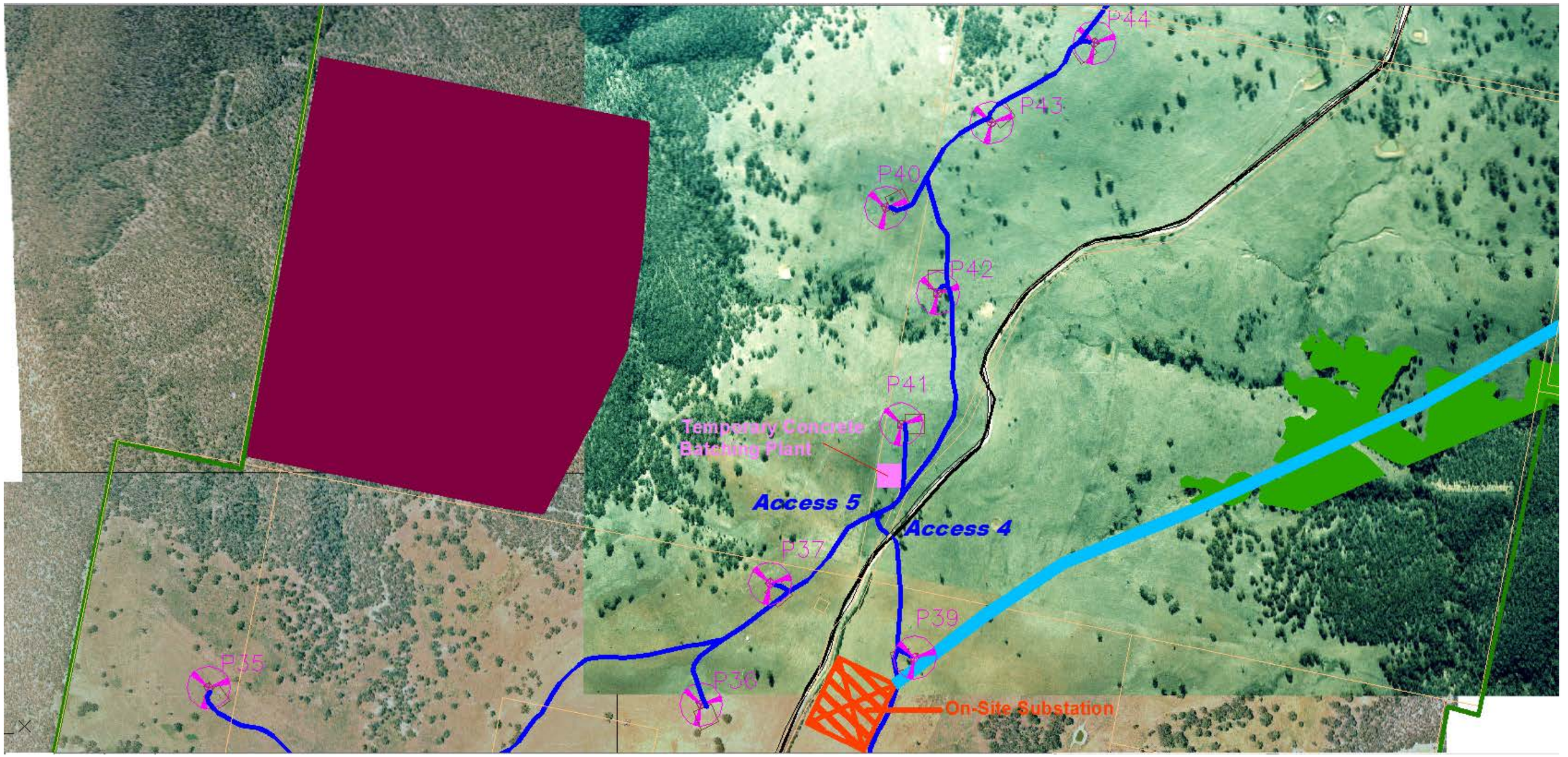
Offset options - vegetation types	Offset options - CMA sub-regions
River Oak forest and woodland of the NSW South Western Slopes and South Eastern Highlands Bioregions (Benson 85), (LA186)	Crookwell - Lachlan Orange - Lachlan Pilliga - Central West Pilliga (Part B) Upper Slopes - Lachlan Upper Slopes - Central West Liverpool Plains (Part A) Liverpool Plains (Part B)

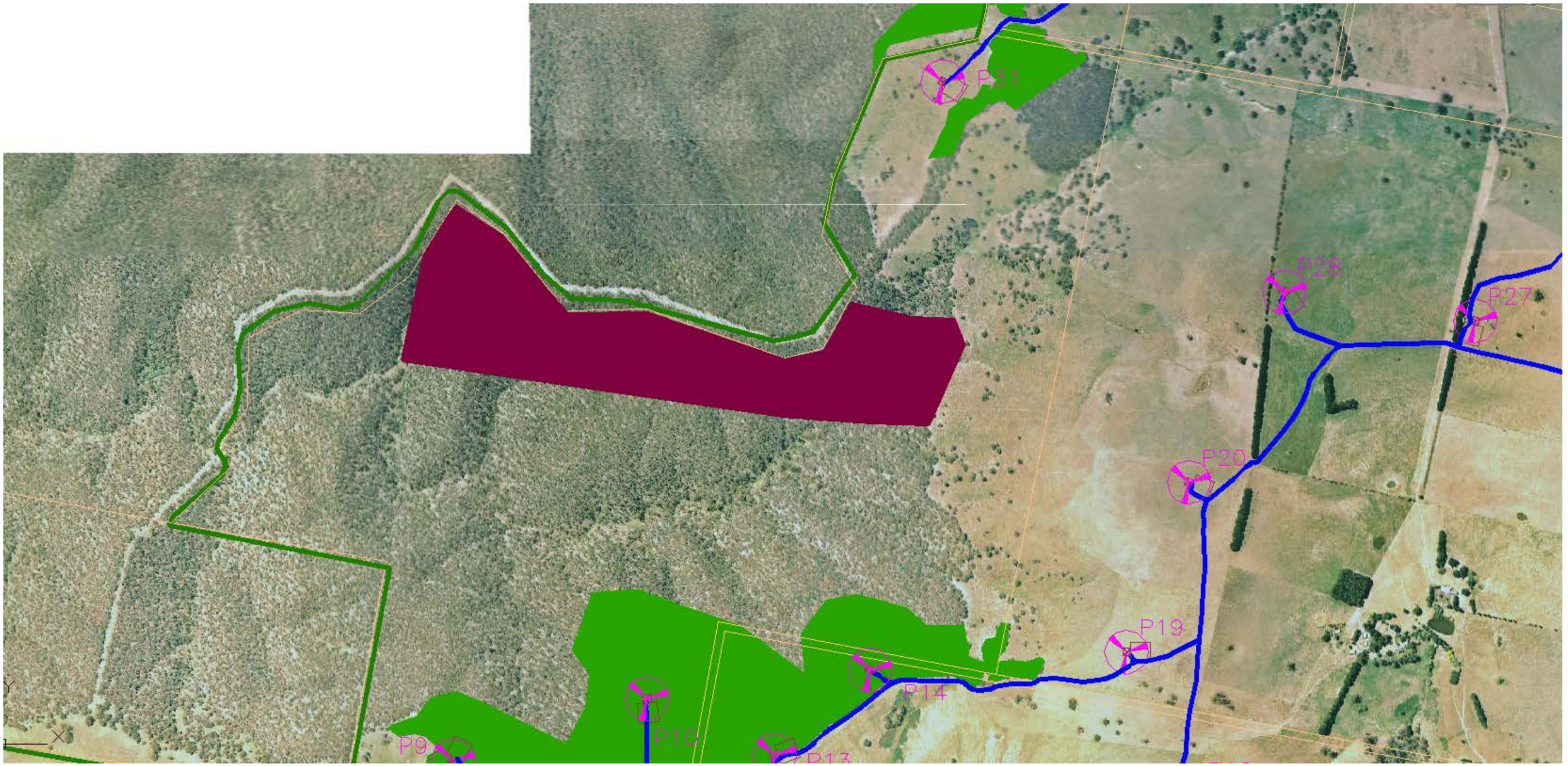
Species credits

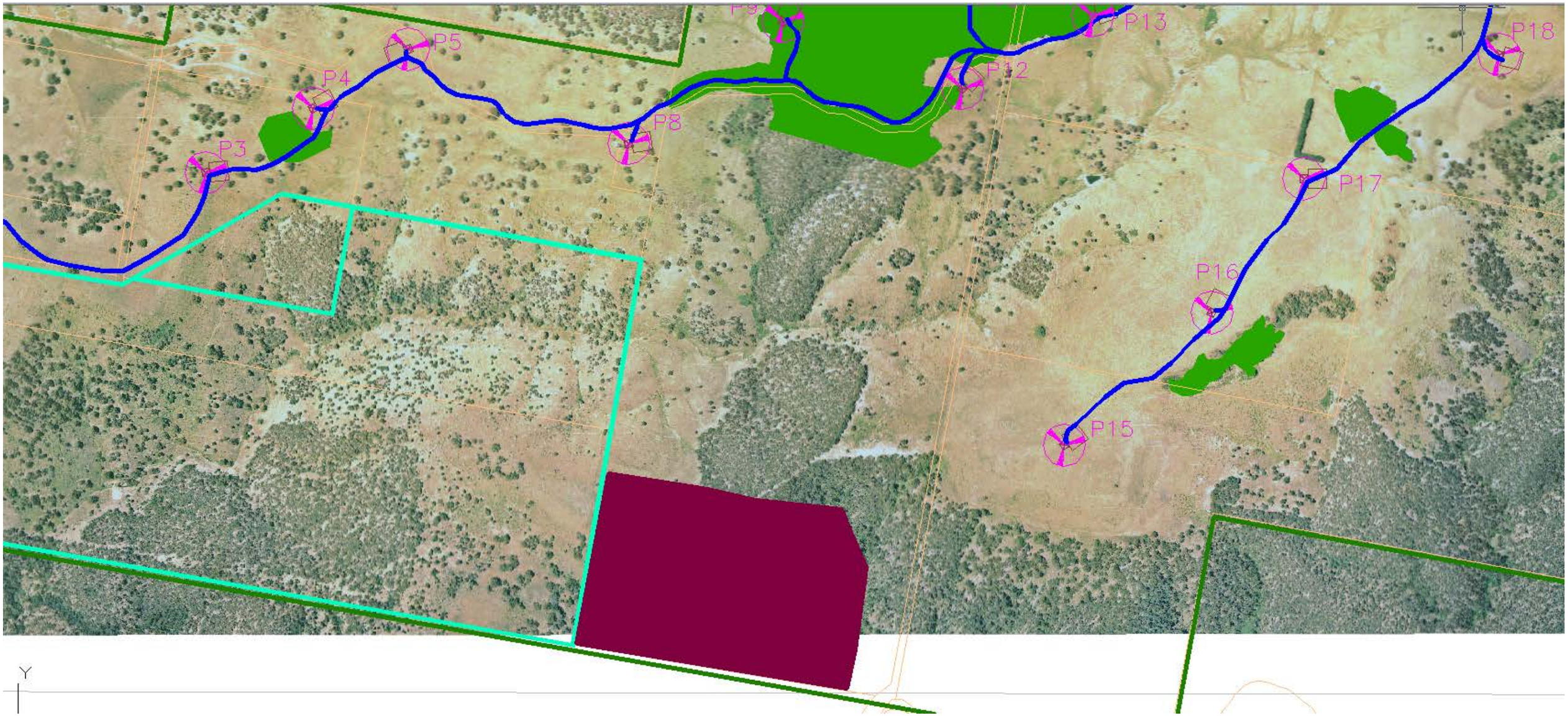
Annex C

Location Of Proposed Potential Offsets









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Environmental Resources Management

PO Box 803
Newcastle NSW 2300
Watt Street Comercial Centre
45 Watt Street
Newcastle NSW2300

T: +61 2 49 035500
F: +61 2 49 295363
www.erm.com

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