



ENVIRONMENTAL CONSULTANTS PTY LTD

TARGETED THREATENED SPECIES ASSESSMENT FOR CROOKWELL 3 WIND FARM

Prepared for
Union Fenosa – Crookwell Development Pty Ltd

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(Conservation Technology 1992)

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Executive Summary

Anderson Environmental Consultants Pty Ltd was engaged by Crookwell Development Pty Ltd (CDPL) to undertake an Ecological Assessment addressing the environmental assessment requirements for the proposed Crookwell 3 Wind Farm (**project**). The results of this assessment were reported in a report entitled Ecological Assessment dated June 2010 (**Main Report**).

The Main Report concluded that:

- The project is not likely to result in a significant impact on any endangered ecological community or flora species listed under the EPBC Act. Accordingly, the project is not considered, for this reason, to be a controlled action which requires approval under the EPBC Act.
- The project is not likely to result in a significant impact on any fauna species listed under the TSC Act. Accordingly, there is no requirement for a species impact statement to be prepared.

The Main Report concluded that:

- The project is not likely to result in a significant impact on any endangered ecological community or species listed under the EPBC Act. Accordingly, the project is not considered, for this reason, to be a controlled action which requires approval under the EPBC Act.
- The project is not likely to result in a significant impact on any threatened species, population or ecological community listed under the TSC Act. Accordingly, there is no requirement for a species impact statement to be prepared.

This targeted threatened species assessment contains the results of the further targeted field surveys conducted as recommended by the Main Report. These further targeted field surveys detected no threatened species listed under either the EPBC Act (1999) or the TSC Act (1995) within the site. Generally potential threatened species habitat is poor due to historical and current disturbances on the site. The proposal has been designed from its inception to utilise as far as possible existing areas of disturbance such as roads and cleared paddock areas and thus minimise any potential ecological impacts.

Given that no threatened species listed under either the EPBC Act (1999) or the TSC Act (1995) was identified within the site, this report:

- confirms the conclusions of the Main Report; and
- confirms that no measures (such as the micrositing of turbines) is required to manage any ecological impacts on listed threatened species.

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1. INTRODUCTION

1.1 BACKGROUND

Anderson Environmental Consultants Pty Ltd was engaged by Crookwell Development Pty Ltd (**CDPL**) to undertake an Ecological Assessment in relation to the proposed Crookwell 3 Wind Farm (**project**).

The Department of Environment, Climate Change and Water (**DECCW**) provided a letter to the Department of Planning recommending that targeted seasonal surveys for several threatened flora and fauna species be included in the Director-General's Requirements for the project (**DECCW DGR Letter**). A copy of the DECCW Letter is contained in Appendix 2 of this report. The requirements contained in the DECCW Letter for targeted seasonal surveys were not ultimately included in the final Director Generals requirements issued in relation to the project. However, in the interests of completeness, these requirements have been addressed in this report.

This report is an addendum to the main Flora and Fauna report (**Main Report**) prepared in relation to the project and should be read as a supplement to the information contained in the Main Report.

1.2 SITE DESCRIPTION

Please refer to section 1.2 of the Main Report for a description of the Site.

1.3 DESCRIPTION OF THE PROJECT

Please refer to section 1.3 of the Main Report for a description of the Project.

1.4 DIRECTOR GENERAL'S REQUIREMENTS

Please refer to section 1.4 of the Main Report for details of the Director-General's Requirements.

1.5 LEGISLATIVE REQUIREMENTS

Please refer to section 1.5 of the Main Report for details of the legislative requirements applying.

2. METHODOLOGY - FLORA

2.1 TARGETED SURVEY REQUIREMENTS

The threatened flora species to be targeted as part of the proposal are outlined in the DECCW Letter. The main report did not recommend any surveys not recommended by DECCW. The methodology required in the DECCW Letter for the surveys of these species was 10 metre transects through all areas of woodland/grassland. The following flora species were listed in DECCW Letter as to be specifically targeted in the seasonal surveys.

- *Rutidosia leptorrhynchoides* (Button Wrinkle Wort)
- *Ammobium craspedioides* (Yass Daisy)
- *Lepidium hyssopifolium* (Aromatic Peppergrass)
- *Swainsonia sericea* (Silky Swainson Pea)
- *Swainsonia recta* (Small Purple-pea)
- *Prasophyllum petilum* (Tarango Leek Orchid)
- *Thesium australe* (Austral Toad Flax)
- *Diuris aequalis* (Buttercup Doubletail)

Surveys for these flora species were undertaken during October 2010 to mid-January 2011. The surveys were based on a transect approach as required in the specific survey requirements from DECCW.

2.2 SURVEY METHODOLOGY

The surveys were undertaken primarily on Crookwell 3 East and to a lesser extent on Crookwell 3 South. This was due to the lack of potential habitat on Crookwell 3 South due to its very high levels of agricultural management and pasture improvement. Generally the potential habitat on site for most of these species was low to moderate based on the potential habitat present.

The approach for the surveys was to undertake transects across the site within potential habitat at intervals of 4 weeks apart to account for the varying potential flowering times of the various species. These areas of potential impact are shown in Appendix 3 which shows the proposal layout in relation to proposed turbine locations and access roads. A total of 12 days (3 days each month) were spent undertaking transects for these species. The survey locations corresponded with the locations of the turbines and their related infrastructure along with a general coverage of other areas of the site. In general however more time was spent surveying areas which could potentially be directly or indirectly impacted by the proposal. Transect width varied between 5 to 10 m. This was as a result of the topography on the site combined with the variation in the habitats present. Many of these areas were also surveyed in the previous surveys which were undertaken. As such, the coverage of the site in relation to potential threatened flora species is considered adequate.

2.3 LIMITATIONS

Every survey has limitations in relation to timing and season. The surveys were undertaken during the known flowering season of the species being surveyed. Rainfall was greater than for the previous 10 years and it is likely that most of these species, if present would have taken advantage of the higher than average rainfall and flowered. There were high levels of weeds present late in the season in some areas following the high levels of rain which were recorded. These high levels of weeds did reduce the potential visibility of any threatened species in the affected areas.

2.4 RESULTS (FLORA)

2.4.1 Survey Results

The results of the surveys for the threatened flora species outlined in the DECCW Letter detected no threatened species or populations of these species.

General

The results of the field surveys detected no individual specimens of threatened flora species or any high quality potential habitat for threatened flora species. The vegetation across the site is represented for the most part by cleared grazing paddock, most of which is highly disturbed. Most of the more fertile areas of the site have been extensively cleared for grazing (primarily sheep grazing but also cattle). This historical use for farming has reduced the extent of native flora on the site within these areas. Parts of these cleared areas (primarily at the lower altitudes) would have probably once represented the Endangered Ecological community of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland however these areas are now largely cleared and pasture improved. The surveys targeted areas of potential habitat for the subject species to occur and focussed on areas of potential disturbance with greater detail. The vegetation remnants represent the areas described below and in general these are not being impacted except where stated.

Remnant Native Vegetation

There are the following areas of remnant native forest vegetation remaining within the site as shown on the map in Appendix 3:

Remnant A

This remnant represents an area of approximately 45 hectares on the property of Hillview Park. It occurs approximately between two lines of turbines which are proposed to be located to its east and west. The turbine locations have been designed to avoid this remnant vegetation as do the service connections and there would be no disturbance to this vegetation as a result of this project. As such there would be no significant impacts.

The vegetation association in this remnant is representative of Western Tablelands Dry Forest. It contains Red Stringybark (*Eucalyptus macrorhyncha*), Silvertop Ash (*Eucalyptus sieberi*), Brittle Gum (*Eucalyptus mannifera*), Scribbly Gum (*Eucalyptus rossii*) and Candlebark (*Eucalyptus rubida*). This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no listed threatened

species were detected in this area. This vegetation would not be disturbed or impacted by the project.

Remnant B

This remnant represents an area of approximately 171 hectares on the property of Hillview Park. It joins to some vegetation across the boundary to the adjoining property to the south. It is a very large remnant and represents the poorer country, which remains as on many farms due to its poor soil type and low agricultural potential. The vegetation is fenced off and is generally not grazed. Two turbines are proposed to be located at the margin of this remnant on two hill tops. These are turbines A18 and A19. No threatened species or good quality habitat for threatened species was detected and there would be minimal impact as construction impacts are proposed to be rehabilitated.

The vegetation association in this remnant is representative of Western Tablelands Dry Forest. It is dominated by Red Stringybark (*Eucalyptus macrorhyncha*) and Silvertop Ash (*Eucalyptus sieberi*) with other species such as Broad-leafed Peppermint (*Eucalyptus dives*), Brittle Gum (*Eucalyptus mannifera*), Scribbly Gum (*Eucalyptus rossii*) and Candlebark (*Eucalyptus rubida*). This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no listed threatened species were detected in this area.

Remnant C

This remnant occurs near to proposed turbine A17. It is a small remnant of approximately 3-4 hectares in size. It is fully fenced and not used for grazing. It would not be disturbed as part of the project.

It contains Red Stringybark (*Eucalyptus macrorhyncha*), Broad-leafed Peppermint (*Eucalyptus dives*), Brittle Gum (*Eucalyptus mannifera*), and Candlebark (*Eucalyptus rubida*). This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no listed threatened species were detected in this area. This remnant would not be disturbed by the project.

Remnants D, E and F

These remnants have been quite disturbed in the past through some historical clearing. They contain Red Stringybark (*Eucalyptus macrorhyncha*), Broad-leafed Peppermint (*Eucalyptus dives*), Brittle Gum (*Eucalyptus mannifera*), and Candlebark (*Eucalyptus rubida*). This vegetation is not representative of any Endangered Ecological Community listed under the EPBC Act or the TSC Act and no listed threatened species were detected in this area. Remnants D and F would not be disturbed by the project. Remnant E has been quite disturbed in the past and would have some disturbance from proposed turbine A12, however this disturbance would not create a significant impact on this remnant.

Remnant G

This remnant occurs on the property Wollondilly well away from any of the proposed development. It has been disturbed in the past through some historical clearing. It contains Red Stringybark (*Eucalyptus macrorhyncha*), a few Yellow Box (*Eucalyptus melliodora*), Broad-leafed Peppermint (*Eucalyptus dives*), and Candlebark (*Eucalyptus rubida*). This area is highly modified and would require little to no disturbance as the access is already existing as part of the old Crookwell to Goulburn Road which remains as the main access to this

property. This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no listed threatened species were detected in this area.

Remnant H

This remnant occurs adjacent to Pejar Dam. It has been disturbed in the past through the road construction and use of this area as a recreational area. It has also been disturbed in the past through some historical clearing. It contains Red Stringybark (*Eucalyptus macrorhyncha*) and Broad-leafed Peppermint (*Eucalyptus dives*). This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no listed threatened species were detected in this area. There would only be minimal and temporary disturbance to this vegetation for the construction of the electricity easement line. Temporary disturbance of this vegetation for the electricity line easement would be in the order of 3000 square metres.

Paddock Areas (outside described remnants)

The main remnant areas have been described above. The other areas that occur are represented by largely modified paddocks. The levels of exotic species are generally high and most of the paddocks to be disturbed have been pasture improved. No listed threatened species were detected in these areas.

Impacts of the project on remnant native vegetation

Turbines

Of the areas of remnant native vegetation only 3 turbines are proposed to be located in these remnant vegetation areas being turbines A12, A18 and A19 which are proposed to be located within remnants E and B. Only approximately 314 m² of this remnant vegetation is required to be disturbed for each turbine location. In addition approximately 2000 square meters would be required for the road access for A12 and 4000 square metres for the combined road accesses for A18 and A19. This level of vegetation removal is not considered significant for these remnants and would not constitute a significant impact. Targeted surveys detected no threatened species or good quality threatened species habitat within this area. There would be no significant impact on any potential habitat for threatened species.

Internal Access Tracks

Apart from the turbines, the only significant vegetation disturbance that will result from the project is the internal access tracks required to access the turbines. As largely existing tracks will be used no significant impacts are likely.

The following three possible access roads were examined for the proposed Crookwell 3 East:

- **Option 1** - Greywood Siding Road. This proposed access is option one and is the preferred access to the property. It utilises the existing Greywood Siding Road from Woodhouselee Road and this is termed Option 1 and is the preferred option for the access for Crookwell 3 East. This access is formed as a vehicle track and road reserve of 20 metres in width. It comes off Woodhouselee Road and is a defined road which is signed. The road passes through existing farm paddock which is highly modified and grazed for approximately 1.8 km of its length running from Woodhouselee Road to the east before the road turns north. Once the road turns north it is still highly modified

grazing paddock with a combination of exotic and a few native pasture grass species. At the location of the old Goulburn to Crookwell railway crossing a small native vegetation remnant occurs which is represented by Red Stringybark (*Eucalyptus macrorhyncha*), Broad-leafed Peppermint (*Eucalyptus dives*), Brittle Gum (*Eucalyptus mannifera*), and Candlebark (*Eucalyptus rubida*). This vegetation is not representative of any Endangered Ecological Community as listed under the EPBC Act or the TSC Act and no threatened species were detected in this area. This would only have minimal impacts from the potential construction of the road for the access as the route of the road would be at its western extremity and most of this remnant occurs to the east of the proposed access road. Past this point the vegetation is generally cleared paddock with a mix of exotic and some native species and generally few overstorey tree species.

- **Option 2** – is from Woodhouselee Road just north of the existing access for the Hillview Park property. This access crosses grazed grassland which has been pasture improved. There would be negligible removal of native vegetation and there is no threatened species habitat present.
- **Option 3** – is to utilise the existing Boltons Road to access Crookwell 3 East. This is a formed road and would not result in any ecological impacts.

The following two possible access roads were examined for the proposed Crookwell 3 South:

- **Option 1** – This would utilise the existing access to the property known as Wollondilly. This access is part of the old Crookwell to Goulburn Road, which is a dual bitumen carriageway. The vegetation along this area contains mainly Red Stringybark (*Eucalyptus macrorhyncha*) and Broad-leafed Peppermint (*Eucalyptus dives*). This would not impact any of this vegetation as the road is already present.
- **Option 2** – An access from the approximate centre of the property through to the Crookwell to Goulburn Road. This contains paddock with no significant impact likely from this option. Negligible native vegetation would require removal.

Extent of clearing required for the project

The extent of clearing of remnant vegetation as a result of the project would be small. These areas are shown on the maps in Appendix 3. The approximate areas of vegetation required to be removed are outlined below and these areas and their surrounds were targeted for any potential threatened species as part of the targeted surveys which were undertaken;

- Turbine A12 (314m² –turbine location) with the addition of 2000m² for its access road (total removal of vegetation being 2314m²). The removal of vegetation would be within mapped remnant E.
- Turbines A18 and A19 (314m² for each turbine location) with the addition of 4000m² for their road accesses (total removal of vegetation being 4628m²). The removal of vegetation would be within mapped remnant B.
- Greywood Siding Road proposed access would remove approximately 5000m² of vegetation combined for the whole of its route.

- Wollondilly access point and the transmission line interconnection around Pejar Dam would remove approximately 4000m² of vegetation in total.

The clearing of these areas would not result in any significant impacts on any endangered ecological communities and no listed threatened species were detected in the areas to be cleared. The other areas where the turbines and other infrastructure are located represent cleared grazing paddock much of which is pasture improved.

3. METHODOLOGY - FAUNA

3.1 TARGETED SURVEY REQUIREMENTS

The threatened fauna species to be targeted were outlined in the DECCW Letter. The main report did not recommend any additional surveys not listed by DECCW. The methodology outlined for the surveys of these species was based on the DECCW Letter as provided in Appendix 2 of this report. The following fauna species were outlined in the DGR's to be specifically targeted in seasonal surveys.

- Pink-tailed Worm Lizard
- Little Whip Snake
- Striped Legless Lizard
- Grassland Earless Dragon
- Squirrel Glider
- Regent Honeyeater
- Brown Treecreeper
- Diamond Firetail
- Hooded Robin
- Speckled Warbler
- Varied Sittella
- Scarlet Robin
- Barking Owl
- Powerful Owl
- Gang Gang Cockatoo
- Glossy Black Cockatoo
- Superb Parrot
- Eastern False Pipistrelle
- Eastern Bent Wing Bat
- Large-footed Myotis
- Greater Broad-nosed Bat
- Yellow-bellied Sheath Tailed Bat
- Greater Long-eared Bat
- Golden Sun Moth

3.2 SURVEY METHODOLOGY

The methodology used was based on the requirements for the specific species being targeted as outlined in the DECCW Letter (Appendix 2). Although potential habitat for many species was marginal, all identified better quality habitat was surveyed. Generally the better quality habitat corresponded to the existing remnants and the eco-tones which occur between these and the surrounding pasture areas. Survey in both the native vegetation remnants along with their associated eco-tones increases the effectiveness of the survey in detecting any present threatened species. Surveys were undertaken during the correct climatic conditions for each potential targeted species. Surveys for microchiropteran bats were undertaken previously and no threatened species were detected. As such these surveys were not repeated. The large

forest owl surveys were undertaken at the same locations as the previous Anabat surveys as shown on the map in Appendix 3.

3.3 LIMITATIONS

Every survey has limitations in relation to timing and season. The weather over the past year has been unseasonal with the breaking of the drought. The potential impact of this on the individual fauna species is unknown. However it is likely to have made most threatened fauna species more detectable due to a potentially higher level of breeding due to increasing levels of resources. The project has been designed so as to avoid potential impacts on any threatened species habitat. This has been achieved through the use of existing access tracks and existing disturbed pasture improved areas for most of the proposal. As such, the potential to impact any threatened fauna species which are potentially present and/or their habitats has been highly reduced through the design of the project.

3.4 RESULTS FAUNA

3.4.1 Survey Results

The results of the field surveys did not detect any of the threatened fauna species identified for targeting in the DECCW Letter.

General

The results of the field surveys detected no individual threatened fauna species listed under either the EPBC Act or the TSC Act within the site. Most of the areas where the turbines and access roads/electricity easements are proposed represent cleared grazing paddock with high levels of disturbance and limited fauna habitat for most of the fauna listed. Only three of the proposed turbines are located in forested areas and these are proposed turbines A12, A18 and A19. The targeted surveys in these areas did not detect any threatened species and it was in these locations that trapping for Squirrel Gliders was undertaken. The density of hollow trees which could potentially provide habitat for threatened species in these areas amongst the over story eucalyptus was moderate to low and the sizes of the hollows were generally small.

The Main Report recommends that, once the roads are pegged by surveyors potential hollow habitat trees (that require removal) should be identified by ecological survey. These trees should be stag watched at dusk using infra-red spotlights and anabat detectors to determine usage by any threatened microchiropteran bats. Accessible tree hollows that require removal should be inspected for fauna by infrared telescopic camera prior to removal to ensure that no species present in the hollow are harmed during removal. Adopting this recommendation will limit impacts on any threatened species such as microchiropteran bats which may be present although not detected during targeted surveys.

The history of the use of most of the turbine sites through clearing for grazing, current grazing and pasture improvement has severely degraded the habitat throughout most of the study site. This has resulted in high levels of introduced pasture grass species and weeds in many areas. Due to the proposed use of many of the existing access roads the levels of

impacts are reduced and there would be no impacts on stream habitats. As the land is already fragmented there are considered to be no biodiversity corridor impacts likely and no threatened species were detected during the targeted surveys which were undertaken.

4. DISCUSSION

4.1 FLORA

The targeted threatened flora species surveys detected none of the threatened species which were being targeted by the surveys. As these species were not detected during the previous or current surveys it is unlikely that they occur on the site. Accordingly, there would be no potential impacts on these listed threatened flora species or their habitats and the results of the impact assessment in the main ecological impact assessment report for this project remain unchanged. As discussed previously the project was designed from inception based on the “avoid” principle to avoid potential impacts on biodiversity and vegetation communities as far as possible. This was done through using mainly existing access roads and targeting other potential development towards cleared paddock areas.

4.2 FAUNA

The targeted threatened fauna species surveys detected none of the threatened species which were being targeted by the surveys. As these species were not detected during the previous or current surveys it is unlikely that they occur on the site. Accordingly, there would be no potential impacts on these species or their habitats and the results of the impact assessment in the main ecological impact assessment report for this project remain unchanged. As discussed previously the project was designed from inception used the “avoid” principle to avoid potential impacts on biodiversity and vegetation communities as far as possible. This was done through using mainly existing access roads and targeting other potential development towards cleared paddock areas.

5. CONCLUSIONS

The targeted surveys which were undertaken did not detect any of the listed threatened species being targeted. The findings of this report confirm the conclusions of the Main Report, indicating that the project is unlikely to have a significant impact on any communities, populations or threatened species listed under the EPBC Act or the TSC Act.

The results of these targeted surveys confirm that:

- The project is not likely to result in a significant impact on any endangered ecological community or species listed under the EPBC Act. Accordingly, the project is not considered, for this reason, to be a controlled action which requires approval under the EPBC Act.
- The project is not likely to result in a significant impact on any species listed under the TSC Act. Accordingly, there is no requirement for a species impact statement to be prepared.

6. RECOMMENDATIONS

Please refer to the recommendations outlined in section 7 of the Main Report which this report confirms.

7. REFERENCES

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8. APPENDIX 1 – SURVEYS AND SURVEY EFFORT

Species	Survey Season	Survey Effort
Pink Tailed Worm Lizard and Little Whip Snake	August to October (Rocky Slopes after Rain)	3 sessions of 1 day each
Striped Legless Lizard (<i>Delmar impar</i>)	Nov-Dec (6 weeks of trapping). Trapping in dense Kangaroo Grassland. Roof tiles to be placed in potential habitat 4 month prior to trapping (August to place roof tiles)	Trapping undertaken from second week of November (both pit and funnel)
Grassland Earless Dragon (<i>Tympanocryptis pinguicolla</i>)	Spider Tubes for 10 weeks from February to April with tubes checked twice a week. Two tubes per hectare in Grassland Habitat.	Trapping commenced in mid-January due to warm season and almost complete at time of writing.
Squirrel Glider	Live Trapping in trees with traps 50-100 metres apart in potential habitat set for 3-4 consecutive nights. Traps checked in the morning and closed until dusk when they are re-opened. (No specific Season Required)	120 trap nights in remnants B and E.
Regent Honeyeater	Call Playback in Spring-Summer in potential foraging or breeding habitats.	Undertaken over 2 days (September and January) around vegetation remnants.
Brown Treecreeper, Diamond Firetail, Hooded Robin, Speckled Warbler and Varied Sittella.	Early morning and or late afternoon on three occasions separated by a period of one week each. Three locations must be spread across the site. (No specific time of year required)	Undertaken during September, December and late January at ecotones.
Scarlet Robin	Diurnal bird census in early morning and or late afternoon on three occasions separated by one week each. Surveys to be conducted from July to January. Surveys to concentrate on ridges, hills and foothills.	Undertaken during July, September, and January at ecotones.
Barking and Powerful Owls	1 site per 100 ha. Survey for potential nest trees. Surveys best undertaken in Winter over 3 nights.	Surveys undertaken in August at the same locations as anabat. Surveys over 3 nights.
Gang Gang Cockatoo/ Glossy Black Cockatoo/ Superb Parrot	Diurnal surveys and nesting assessments using stagwatching and call identification in late afternoon. Gang Gang (Sept-January) Glossy Black (March to August) Superb Parrot (September to December)	Two days for each species separated by one month each.
Microchiropteran Bats Eastern False Pipistrelle, Eastern Bent Wing Bat, Large Footed Myotis, Greater Broad Nosed Bat, Yellow bellied Sheath Tailed Bat and Greater Long Eared Bat	Surveys have been completed last season.	Surveys previously completed.
Golden Sun Moth	October to December. Hand netting during known flight periods in > 40% <i>Austrodanthonia</i> in the groundcover.	Surveys during October, November and December. Undertaken while doing other surveys for extensive coverage.
Swainsonia sericea, Swainsonia recta, Prasophyllum petilum,	Transects 10 metres apart through all areas of woodland /grassland.	October to mid January.

Austral Toad Flax. <i>Diuris aequalis</i> (Oct-Nov)		
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9. APPENDIX 2 – LETTER FROM DECCW

Director General's Requirements for Environmental Assessment
Crookwell Wind Farm

Appendix 1: Survey Requirements for Subject Species - DGRs for Crookwell Wind Farm

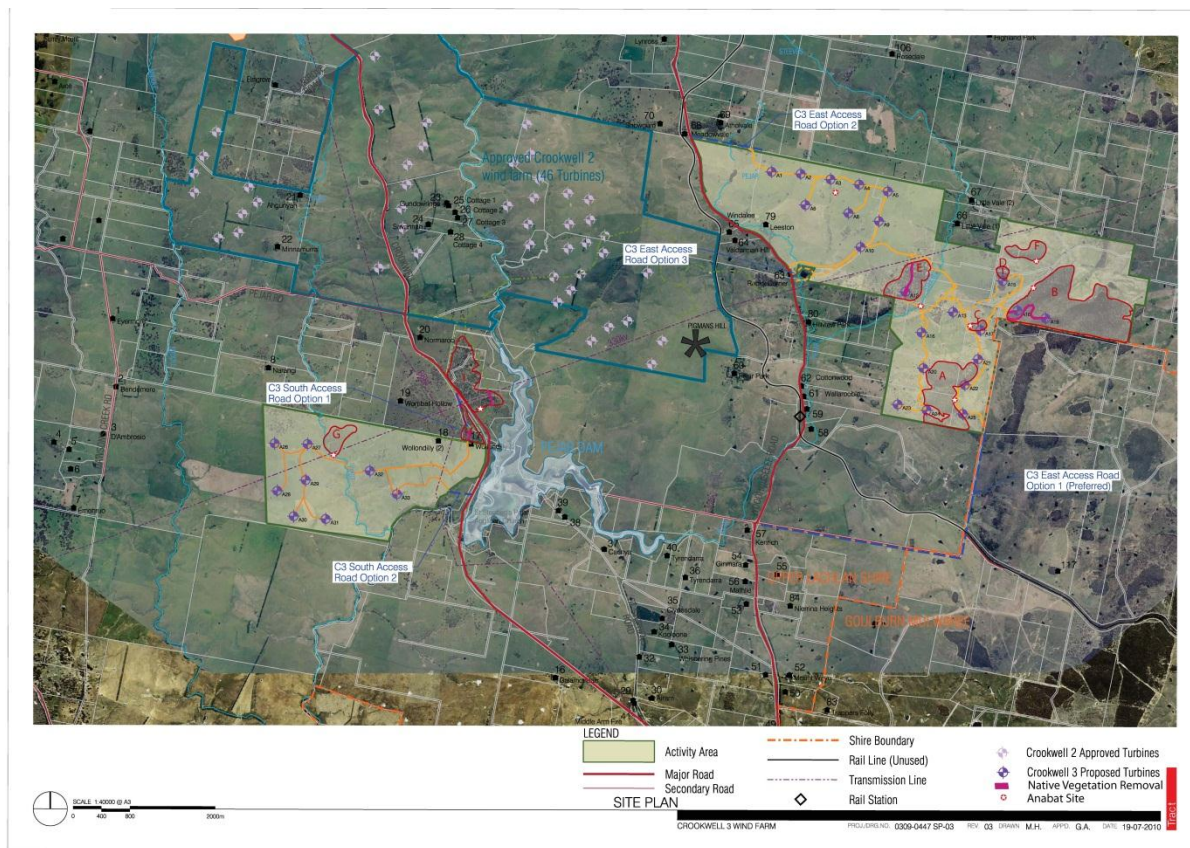
SPECIES	SURVEY REQUIREMENTS
Pink-tailed Worm-lizard and Little Whip Snake	Surveys of the <i>subject site</i> and <i>study area</i> shall be undertaken for this species. All rocky slopes should be systematically surveyed. This shall involve rock rolling and searching under logs and debris. Surveys shall be undertaken between mid-August and the end of October preferably after rain. Daily temperatures shall not exceed 25°C during the survey period. Rocks, logs and debris shall be replaced carefully to sustain habitat integrity. Surveys of the <i>locality</i> for habitat of the species shall be undertaken. These shall involve determining the extent of potentially suitable habitat from aerial photographs or other means, and ground-truthing selected sites to validate habitat suitability, condition and extent. The sites sampled shall be used to provide context to the habitat affected by the action proposed.
Striped Legless Lizard <i>Delma impar</i>	Pitfall trapping for <i>Delma impar</i> should be undertaken for 6 weeks, starting in early to mid November and extending through to mid/late December. Pitfall traps or funnel traps should be placed in suitable habitat being natural temperate grassland or nearby secondary grassland, with a preference for denser Kangaroo grass <i>Themeda australis</i> or other grassland, including <i>Phalaris</i> . Traps should be positioned in cross-shaped arrays of 5 traps each, 10 metres apart, with a trap at the centre and drift fencing extending 5 metres past the outside traps. Traps must be checked daily. In addition, roof tiles should be placed within likely habitat for at least 4 months prior to checking. Checking of tiles should be undertaken at least fortnightly throughout spring and early summer.
Grassland Earless Dragon <i>Tympanocryptis pinguicolla</i>	Spider-tubes should be used to survey areas of suitable habitat, being natural temperate grassland or nearby secondary grassland, with a preference to lower, open areas dominated by wallaby grasses. Survey season should be for 10 weeks from February to April with tubes checked twice a week. Density of tubes should approximate 2/ha and be placed within transects of 10 tubes per transect spaced ten metres apart. Tubes should be left at least 2 weeks and no longer than one month prior to checking. In areas where grass is dense, grass around the tubes should be whipper-snipped for a radius of 1 metre around each tube to facilitate location and use by dragons. All spiders found in tubes should be removed at least 10 metres to reduce chance of re-colonisation.
Squirrel Glider	<p>The consultant needs to determine the distribution and abundance of the species on the subject site and its status in the region. Squirrel Gliders may occur across a wide variety of forest and woodland vegetation types.</p> <p>Live-trapping in trees is the preferred survey method for detecting Squirrel Gliders. Traps should be either large Elliott box traps or wire mesh 'bandicoot' traps (200 mm wide x 170 mm tall x 500 mm long; Figure 2) (manufactured by R.E. Walters Pty. Ltd., Sunshine, VIC).</p> <p>Live-trapping is a preferred sampling technique as it allows for unequivocal identification of animals. This is particularly important as the Squirrel Glider is very similar in appearance to the smaller Sugar Glider, <i>P. brevicaeps</i>.</p> <p>If definite identification cannot be made then any captured animals should be photographed and measured. Subsequent identification of the animal in question can then be made by an appropriate expert.</p>

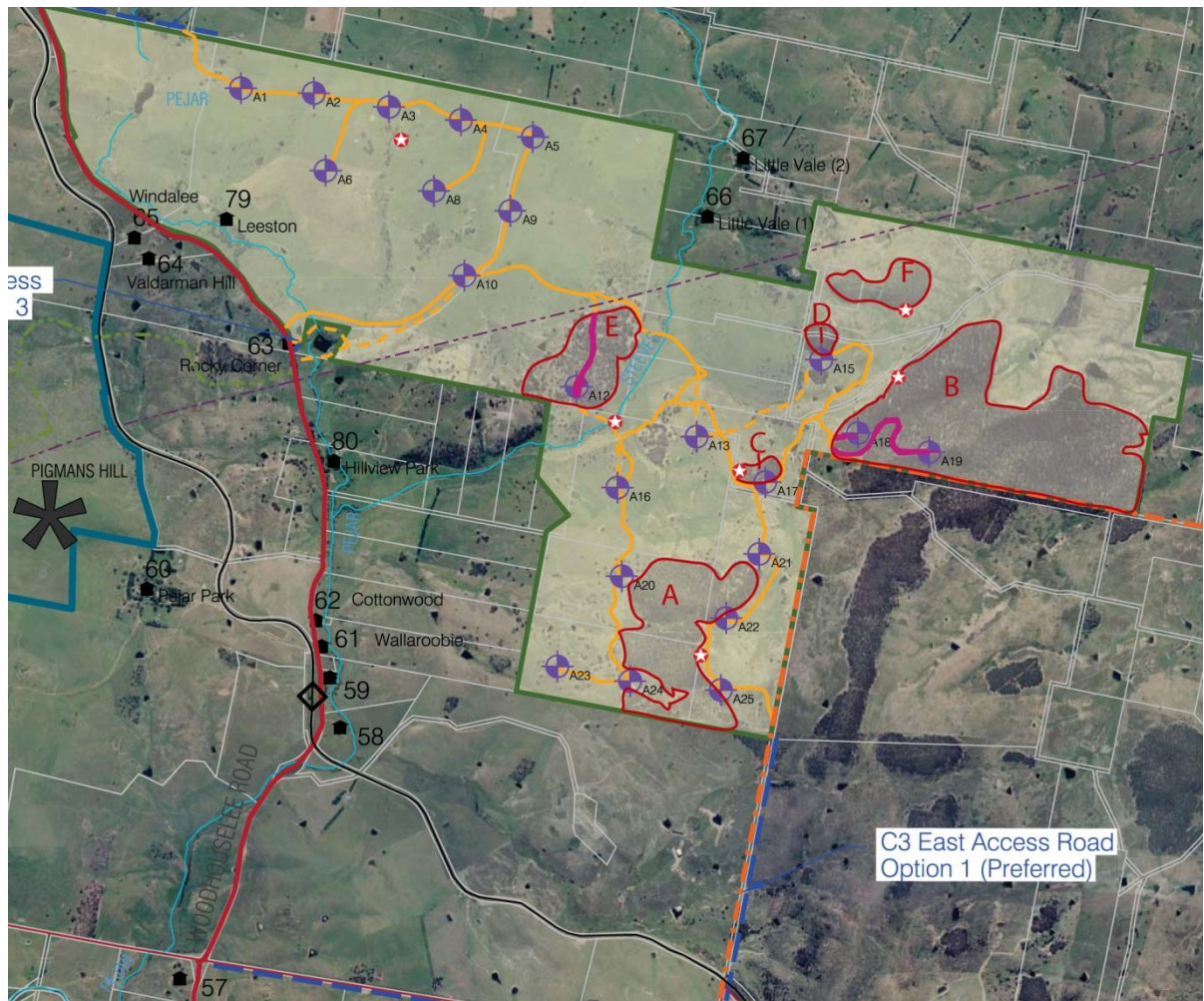
SPECIES	SURVEY REQUIREMENTS
	<p>Bait should consist of a mixture of peanut butter, honey and rolled oats. A honey and water solution may be sprayed above and below the trap entrance.</p> <p>The number of traps set at a site will vary according to the extent of suitable habitat, the area over which possible den sites are present, and the scale of the proposed clearing or activity. Traps should ideally be positioned horizontally in low tree branches. Traps must be attached to trees and spaced approximately 50-100 m apart in a transect or grid layout, as the habitat allows. Traps must be set for a minimum period of 3-4 consecutive nights. On each day traps should be set at dusk and checked the following morning. Where possible, traps should not be left open during daylight hours, particularly during periods of hot weather. In situations where the same animals are being repeatedly trapped, individual trap stations may need to be closed. If the species is present, given the rarity of the species in the region, any proposed development must avoid direct impacts on the species in the first instance, minimise any unavoidable or indirect impacts, and then set up processes which establish long-term conservation of the species on-site.</p>
Regent Honey eater	<p>The regional significance of the subject site for the Regent Honeyeater is unknown. There are potential breeding and foraging habitats on the subject site that should be surveyed using diurnal fixed-width transect or point-count surveys and call playback techniques, as the species responds to taped calls during the breeding season. Whilst surveys can be conducted at any time of the year, the optimal time is spring and summer during the breeding season.</p>
Brown Treecreeper, Diamond Firetail, Hooded Robin, Speckled Warbler and Varied Sittella.	<p>Diurnal bird census shall be undertaken in the early morning and/or late afternoon within the <i>subject site</i> on three occasions each separated by a period of one week. Each census shall comprise observations for birds, including call recognition, for a period of 45 minutes at a minimum of three locations spread across the subject site. Surveys can be undertaken at any time of the year, but shall avoid high-wind and/or rainy days.</p>
Scarlet Robin	<p>Diurnal bird census shall be undertaken in the early morning and/or late afternoon within the <i>subject site</i> on three occasions each separated by a period of one week. Each census shall comprise observations for birds, including call recognition, for a period of 45 minutes at a minimum of three locations spread across the subject site. Additional opportunistic bird census shall be employed across the <i>study area</i> and <i>locality</i> during the course of other surveys for the EA. Surveys should be concentrated on ridges, hills and foothills. Surveys should be between July to January however can be undertaken at any time of the year, but shall avoid high-wind and/or rainy days.</p>
Barking Owl & Powerful Owl	<p>Nocturnal call playback (1 site per 100 ha) with an initial listening period of 10 min then play the call of each subject species separated by at least a 2 min listening period, then finish with a 10 minute listening period.</p> <p>Identify and map all hollow-bearing trees (potential nest trees) on the subject site and estimate the availability of hollow-bearing trees in the locality.</p>
Gang Gang Cockatoo / Glossy Black-cockatoo/ Superb Parrot	<p>Undertake diurnal bird surveys across the study area and nesting assessments using a combination of stagwatching and listening for calls of the birds returning to nests in the late afternoon during the known breeding season of the species, to ascertain the locations of any nest sites in the study area.</p>

SPECIES	SURVEY REQUIREMENTS
	<p>These surveys should target hollow-bearing trees with hollows of suitable size (>10cm diameter) for the species that are to be removed for the proposal or which lie within 50m of areas to be disturbed by the proposal.</p> <p>Estimate the availability, condition and security of potential breeding habitat for the species in the locality by ground-truthing existing vegetation mapping datasets.</p>
<p>Eastern False Pipistrelle, Eastern Bent Wing Bat, Large footed Myotis. Greater Broad nosed bat, Yellow Bellied Sheath Tailed Bat Greater long eared bat</p>	<p>Surveys using anabat recorders and stag watching should aim to identify the number and location of roost sites for the subject bats and identify important foraging habitat in the study area and the locality. If required, the DECCW can provide further advice on bat survey techniques to acquire this information.</p> <p>Surveys of the subject site, study area and locality shall be undertaken for hollow-bearing trees. This shall involve intensive searches for hollow-bearing trees in the subject site and study area. Representative sampling of the locality for hollow-bearing trees shall involve the use of transects in selected locations and the gathering of data in conjunction with ground-truthing for endangered ecological communities. The number of hollow-bearing trees recorded shall be used to provide context to the potential breeding habitat affected by the action proposed.</p>
<p>Golden Sun Moth</p>	<p>Surveys of the <i>subject site</i> and <i>study area</i> shall be undertaken for this species. These surveys should target areas with higher than 40% <i>Austrodanthonia</i> in the groundcover. Areas of habitat should be hand-netted during known flight periods. The flight period for this species is short therefore surveys should be undertaken when other known populations in the area are flying. The consultant should discuss these periods with the DECCW prior to the survey being conducted. Surveys of the <i>locality</i> for habitat of the species shall be undertaken. These shall involve determining the extent of potentially suitable habitat from aerial photographs or other means, and ground-truthing selected sites to validate habitat suitability, condition and extent. The sites sampled shall be used to provide context to the habitat affected by the action proposed.</p>
<p>ENDANGERED ECOLOGICAL COMMUNITIES</p>	<p>SURVEY REQUIREMENTS</p>
<p>Yellow box white box Blaklyis red gum woodlands, Natural temperate grasslands, and Tableland Basalt Forest.</p>	<p>Surveys shall identify the extent and condition of this ecological community in the <i>subject site</i>, <i>study area</i> and <i>locality</i>. This shall involve the use of vegetation surveys in the <i>subject site</i> and the <i>study area</i>. The use of existing datasets held by DECCW in combination with ground-truthing of selected sites within areas mapped by DECCW as the ecological community is recommended for surveys of the <i>locality</i>. The sites sampled shall be used to provide context to the ecological community affected by the action proposed. Surveys can be undertaken at any time of the year under varied seasonal conditions.</p>
<p>FLORA</p>	<p>SURVEY REQUIREMENTS</p>
<p>Button Wrinkle wort, Yass Daisy and Aromatic Peppergrass</p>	<p>Systematic surveys using evenly spaced transects located about 10 m apart through all areas of woodland and grassland.</p>
<p>Austral Toad flax</p>	<p>Systematic surveys using evenly spaced transects located about 10m apart through all areas of wet Kangaroo grass and any other damp areas located in the study area. DECCW</p>

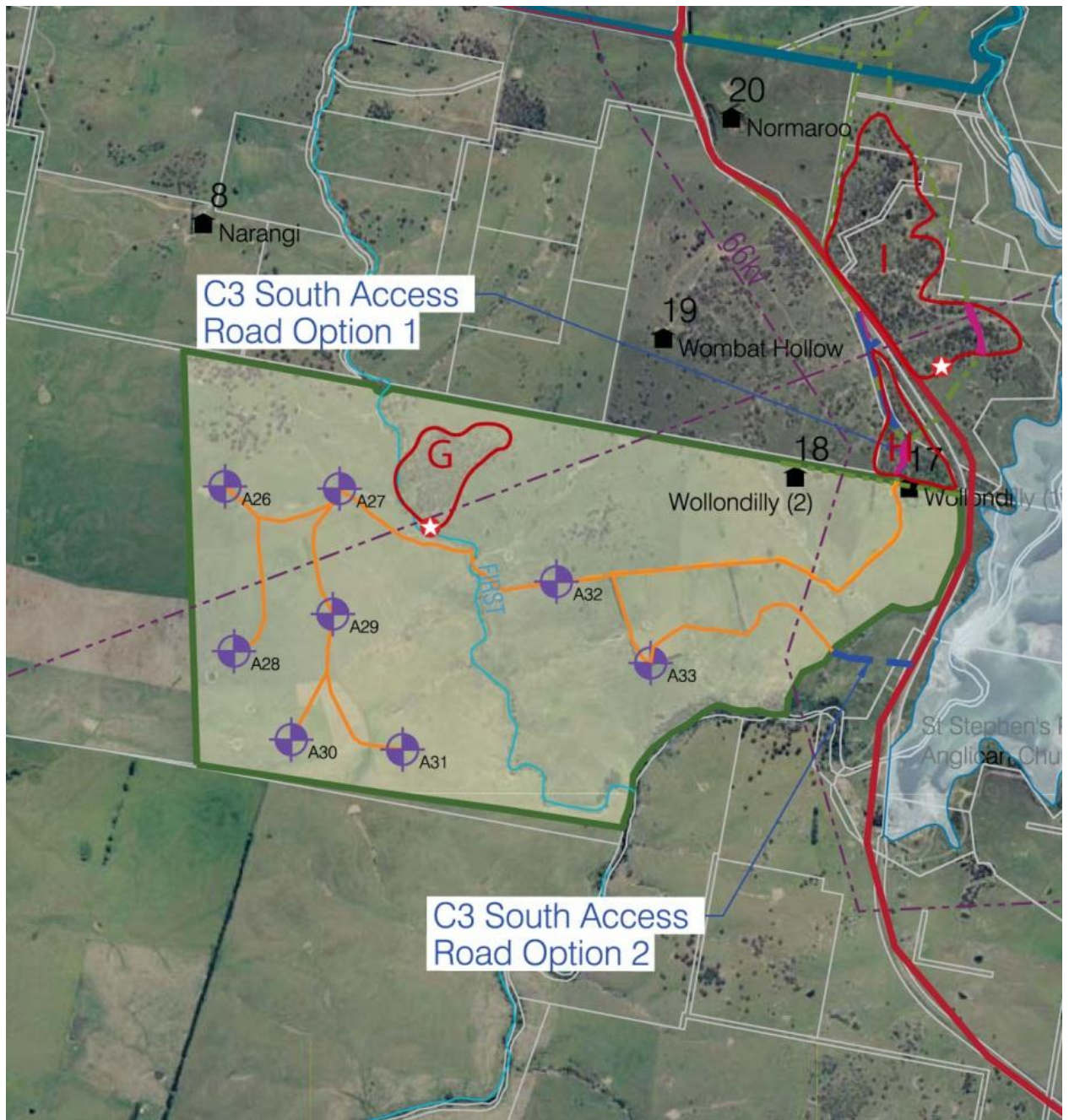
SPECIES	SURVEY REQUIREMENTS
	should be consulted to confirm flowering times with known population and seasons, and appropriate survey methods.
Silky Swainson Pea (<i>Swainsona sericea</i>), Mountian Swaison Pea (<i>Swainsona recta</i>), and Tarengo Leek Orchid (<i>Prasophyllum petilum</i>),	Systematic surveys using evenly spaced transects located about 10 m apart through all areas of woodland/grassland must be undertaken. DECCW should be consulted to confirm flowering times with known population and seasons, and appropriate survey methods.
Doubletail Buttercup, (<i>Diuris aequalis</i>)	Systematic surveys using evenly spaced transects located about 10 m apart through all areas of woodland/grassland must be undertaken. Surveys should be undertaken between late October to early November, between the known flowering season.

10. APPENDIX 3 – MAPPING





Crookwell 3 East - showing areas of vegetation removal in “Pink” within remnants B and E.



Crookwell 3 South – showing proposed vegetation removal marked in “Pink” at proposed access and electrical interconnection area.