

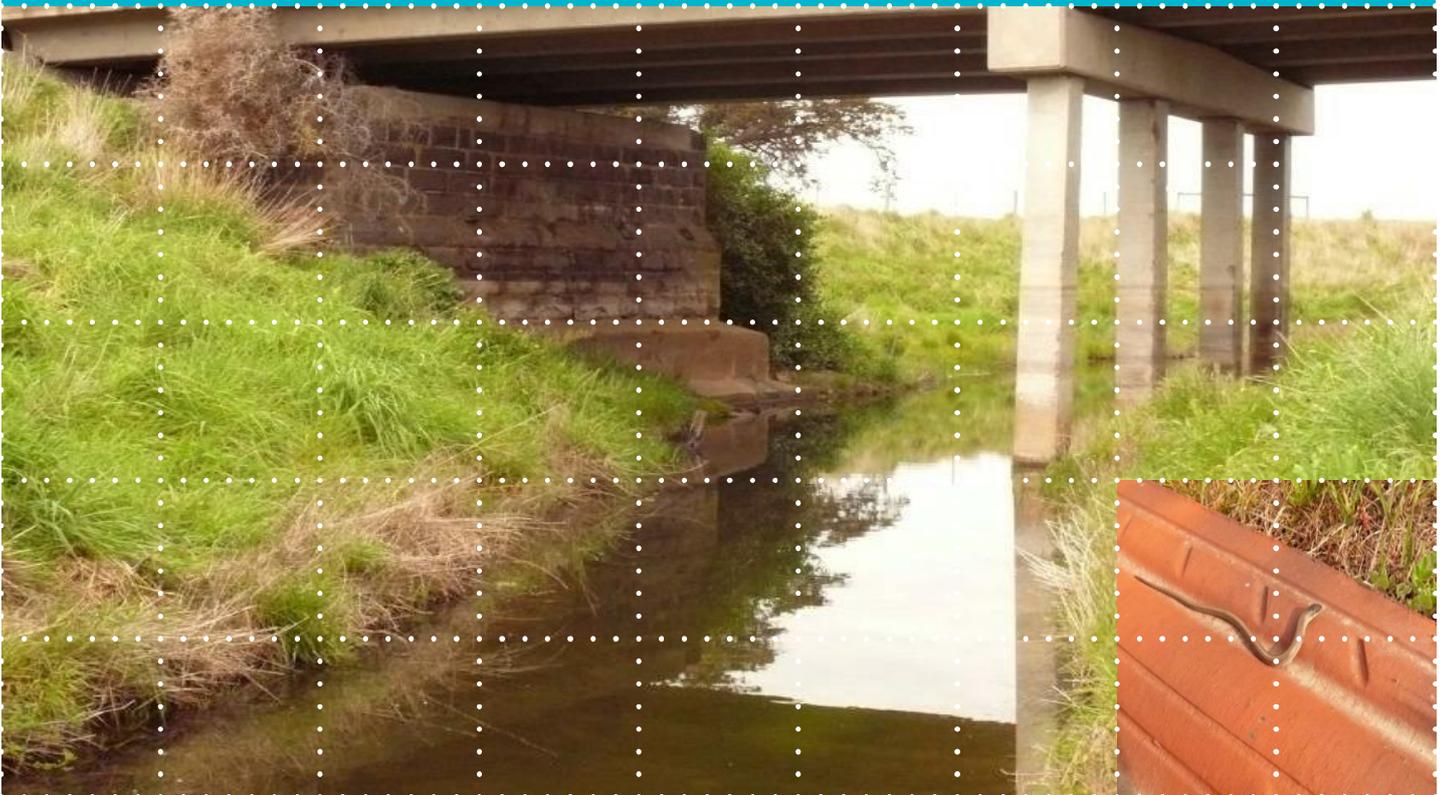
FINAL REPORT:

Targeted Striped Legless Lizard *Delma impar* Surveys of Proposed Borrow Pits within Stockyard Hill Wind Farm, Stockyard Hill, Victoria

PREPARED FOR:

Stockyard Hill Wind Farm Pty Ltd

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Ecology and Heritage Partners Pty Ltd

Table of Contents

Summary	1
1 Introduction	4
1.1 Background.....	4
1.2 Objectives	4
1.3 Study Area	5
1.4 Significant Species.....	6
2 Methods	8
2.1 Nomenclature.....	8
2.2 Database and Literature Review	8
2.3 Targeted Striped Legless Lizard Surveys	8
2.4 Assessment Qualifications and Limitations	15
3 Results	16
3.1 Database Searches.....	16
3.2 Targeted Survey - Striped Legless Lizard	16
3.2.1 Habitat assessment	19
4 Legislative Implications of the Findings	21
4.1 Legislative and Policy Implications.....	21
4.2 <i>Environment Protection and Biodiversity Conservation Act 1999</i>	21
4.3 <i>Flora and Fauna Guarantee Act 1988</i>	22
4.4 <i>Wildlife Act 1975 and Wildlife Regulations 2002</i>	23
4.5 <i>Planning and Environment Act 1987</i>	24
5 Potential Impacts and Mitigation Measures	25
6 Conclusion	27
Figures	28
References	33
Appendices	37

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SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was engaged by Stockyard Hill Wind Farm Pty Ltd (SHWFPL), a subsidiary of Origin, to undertake targeted surveys for the nationally significant Striped Legless Lizard *Delma impar* within the approved Stockyard Hill Wind Farm, Stockyard Hill, Victoria. This has included surveys in both 2011 and 2012 seasons and also follows earlier surveys undertaken by Brett Lane and Associates Pty Ltd.

The objective of the current study was to further refine the distribution and abundance of Striped Legless Lizard populations and their habitats within the areas designated as potential 'borrow pit site options', within Stockyard Hill Wind Farm. Whilst the study area is incorporated within the broader wind farm boundary, the action of creating 'borrow pits' for rock usage during construction is not included in the current actions approved through local, state or federal legislation.

Methods

Targeted surveys for Striped Legless Lizard were conducted in accordance with *Survey guidelines for Australia's threatened reptiles*, with additional micro-climate parameters obtained on each survey date, as outlined in the *Biodiversity Precinct Structure Planning Kit*.

Targeted surveys involved the creation of artificial refuge structures, through establishing tile grids in areas of indigenous grassland and in mosaics of indigenous/exotic grassland within the study area. This survey methodology is widely accepted as the primary survey technique for this species, particularly in areas with surface rock. Ten tile grids were established, each consisting of a grid of 5 x 10 tiles (measuring approximately 25 metres x 50 metres). Of the 10 tile grids within the study area, four were established in the 2011/12 survey season and an additional six tile grids were laid on either 21 or 28 August 2012 throughout the study area. Tiles were then checked on eight occasions between 3 October and 21 December 2012.

Results

There are eleven previous records of Striped Legless Lizard within 20 kilometres of the study area, inclusive of two previous records within the study area. Five Striped Legless Lizards were recorded within the study area during targeted surveys. All five Striped Legless Lizards were recorded at tile grid 10, located in Stockyard Hill Road reserve. The lizards were recorded at this grid on five occasions (3 and 15 October 2012, 8 and 20 November, and 7 December 2012). Fat-tailed Dunnart, a regionally significant marsupial species, was recorded on five occasions (8, 9, 14 and 20 November 2012) at tile grids 7 and 14.

The majority of the study area is modified, as a result of previous land practices (i.e. surface rock removal, cultivation and grazing). However, areas supporting suitable habitat in the form

of modified native grasslands, embedded and surface basalt rock and heavy, cracking clay soils are present at several locations within the study area.

Legislative Requirements

The proposed action of creating borrow pit(s) within the wind farm boundary is not considered in either the Wind Energy Facility (WEF) Planning Permit, or the current approved action for construction the WEF (EPBC Approval 2009/4719). It is recommended that an EPBC Act referral to the Commonwealth Environment Minister be prepared, as the project has the potential to impact upon a species listed under the EPBC Act.

It is a requirement of the current EPBC Approval (2009/4719) for the WEF, that before construction commences, SHWFPL submit to the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) for approval, a Salvage and Translocation Plan for relocating Striped Legless Lizard individuals disturbed during construction of the wind farm. It is possible that a single Salvage and Translocation Plan prepared for construction of the wind farm could incorporate measures for the construction of the borrow pits and be applied across the study area. Further negotiation regarding this will be required with SEWPaC and DSE prior to gaining approval of this approach. As construction within the study area will likely require the direct removal of Striped Legless Lizard habitat, Management Authorisation under the *Wildlife Act 1975* for the capture and release of Striped Legless Lizard will also need to be obtained prior to any salvage and translocation works within the study area.

Potential impacts and mitigation measures

It is understood that SHWFPL, in association with DSE, and input from Ecology and Heritage Partners, will develop management recommendations and contingencies to mitigate/ameliorate potential impacts on Striped Legless Lizard and their habitat in the study area. These recommendations and actions will be detailed in the Striped Legless Lizard Salvage and Translocation Plan, to be prepared to the satisfaction of SEWPaC and DSE. This Salvage and Translocation Plan will detail mitigation measures to be enacted in areas where avoidance of suitable habitat is not practicable. As the 'borrow pit' locations occur within the broader wind farm boundary, the details of this plan should be applied to these areas also.

We recommend the following:

- Stockyard Hill Road reserve, which is known to support a population of Striped Legless Lizard, should be excluded from construction activities as far as practicable. This includes any potential widening of the road, which will impact on a known habitat corridor for the species;
- Habitat areas given a 'High' rating should be subject to micro-siting to avoid Striped Legless Lizard habitat as far as practicable. Further recommendations on the avoidance

and minimisation of impacts on habitat will be incorporated into the Striped Legless Lizard Salvage and Translocation Plan;

- All construction works should avoid vehicle movements off formed roads and access tracks within properties where Striped Legless Lizard habitat is identified, to minimise impacts to those habitat areas;
- A qualified herpetologist/zoologist familiar with the capture and handling of Striped Legless Lizard, should be present for the disturbance and/or removal of identified habitat to salvage any displaced individuals. Details of the methodology to be employed during construction works will be outlined in the Striped Legless Lizard Salvage and Translocation Plan;
- Zoologists undertaking any capture and relocation activities for Striped Legless Lizard within the study area will be required to obtain a Management Authorisation permit under the *Wildlife Act 1975*, issued by DSE; and,
- Consideration of the regionally significant Fat-tailed Dunnart, also recorded within the study area, should be incorporated into any salvage works undertaken within the study area.

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was engaged by Stockyard Hill Wind Farm Pty Ltd (SHWFPL), a subsidiary of Origin, to undertake targeted surveys for the nationally significant Striped Legless Lizard *Delma impar* within the approved Stockyard Hill Wind Farm, Stockyard Hill, Victoria.

Targeted surveys for Striped Legless Lizard were undertaken in Spring/Summer of 2011/12 across the Wind Energy Facility (WEF). The current study aimed to further identify and refine potential impacts on extant populations, and to provide information on mitigation measures associated with the wind farm development, including assessment of potential locations for development of borrow pits.

1.2 Objectives

The objective of the project was to determine the distribution and abundance of Striped Legless Lizard populations and their habitats within the areas designated as proposed ‘borrow pits’, within Stockyard Hill Wind Farm site. Whilst the study area is incorporated within the broader wind farm boundary, the action of creating ‘borrow pits’ for rock usage during construction is not included in the current actions approved through local, state or federal legislation.

The current permits issued for construction of the wind farm state the following in relation to Striped Legless Lizard:

WEF Permit No: PL-SP/05/0548, Condition 11:

“Before development begins, a survey to identify the exact extent of non-indigenous habitat for the Striped Legless Lizard must be undertaken by a qualified ecologist, to the satisfaction of the Minister for Planning upon the advice of DSE (Department of Sustainability and Environment). Should suitable habitat of the Striped Legless Lizard be identified, the wind farm infrastructure layout must be micro-sited to avoid these areas to the satisfaction of the Minister for Planning. If avoidance is not possible, then a salvage protocol for relocating disturbed individuals must be applied prior to construction to the satisfaction of the Minister for Planning on the advice of DSE.”:

EPBC Act Approval (EPBC 2009/4719), Condition 1:

“Prior to any works commencing, surveys for Striped Legless Lizard (Delma impar) and their habitat must be undertaken in areas that will be disturbed by the development of the wind farm and associated infrastructure.”

Based on the conditions placed on the development of the wind farm, it was deemed pertinent to undertake further assessment of the suitability of habitat for the species within the section of the wind farm where the ‘borrow pit’ locations are proposed (Figure 1). The information gathered would be used to apply for the relevant planning permit to extract rock from the study area, along with the preparation of an EPBC Act referral if necessary.

This was to be achieved by establishing 10 tile grids in areas of suitable habitat for Striped Legless Lizard, within the proposed ‘borrow pit’ locations in the south-western portion of the Stockyard Hill Wind Farm (herein referred to as the ‘study area’). Of these 10 grids, four were established last season (2011/12) and were utilised as part of the 10 grids, with an additional six placed within the investigation area in August 2012. These tile grids were checked at regular intervals during the active season for the species (October to December 2012), to determine their presence or otherwise within the study area.

The results of these surveys have informed the categorisation of known and suitable habitat for Striped Legless Lizard within the study area, to be taken into consideration by SHWFPL during their detailed design process.

1.3 Study Area

The approved Stockyard Hill Wind Farm site is located approximately 160 kilometres west of Melbourne (Figure 1). The entire WEF project area has an area of approximately 15,700 hectares (Figure 1) and largely comprises agricultural cropping land, and farming land grazed by cattle and sheep. It is situated in the Pyrenees Shire, to the west of Ballarat, between the township of Beaufort (approximately four kilometres to the north) and the Shire’s southern boundary (approximately 5 kilometres from the northern outskirts of Skipton, which is itself located in Corangamite Shire).

The area being investigated for the current Striped Legless Lizard surveys incorporated the south-west portion of the WEF (Figure 1), where preliminary geotechnical investigations identified suitable rock resources for use during construction of the WEF. As this area was identified as supporting suitable habitat for Striped Legless Lizard during the 2011/12 targeted surveys, further detailed investigations were required in these proposed ‘borrow pit’ locations.

1.4 Significant Species

Striped Legless Lizard *Delma impar*

Status

The Striped Legless Lizard is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), listed as threatened under the *Flora and Fauna Guarantee Act 1999* (FFG Act) and is considered to be endangered in Victoria (DSE 2007) (Plate 1).

Description

The Striped Legless Lizard is a member of the family Pygopodidae, the legless or flap-footed lizards (Cogger 1996). As with other members of the legless lizard family, Striped Legless Lizards lack forelimbs and have only vestigial hind limbs, in the form of scale ‘flaps’ either side of their vent. Superficially, these animals resemble snakes, but can be readily distinguished from the latter by the presence of external ear openings, a fleshy undivided tongue and a tail which is longer than the body (Cogger 1996). Striped Legless Lizards are readily distinguished from other legless lizards by body colouration, body size and head scalation.



Plate 1 Striped Legless Lizard © Ecology and Heritage Partners Pty Ltd

The Striped Legless Lizard is a pale-grey lizard up to 30 centimetres in length, with a maximum snout-vent length (SVL) of approximately 12 centimetres. Striped Legless Lizards have a long thin body and the tail, when unbroken, is about twice the length of the body. They have a series of stripes on their sides and the sides of their back, becoming diagonal bands on the tail (Cogger 1996). These stripes are dark-brown or blackish and extend the whole length of the individual from the neck to the tail. However, in some individuals, particularly juveniles, these stripes may be very faint or absent (Cogger 1996).

Striped Legless Lizards generally feed only on invertebrate prey and are considered a selective arthropod feeder. While the main prey types of the species in Victoria were found to be crickets and noctuid moth larvae, spiders were found to be the predominant prey type within the ACT (O’Shea 2005).

Distribution

Before European settlement, the species was presumed to be common across many grassland areas in north-eastern, central and south-western Victoria, south-eastern NSW, the ACT, and, possibly, south-eastern South Australia (Smith and Robertson 1999), but it has suffered a substantial contraction in both geographic range and abundance over the past 100 years. A combination of factors, including clearing of grasslands for urban development, more intense agricultural practices (e.g. pasture improvement, cropping, and prolonged grazing),

inappropriate fire regimes and weed invasion (e.g. Chilean Needle-grass) threaten the long-term survival of the species (Cogger *et al.* 1993).

The range contraction and resultant reduction in population size is likely to continue, due to the ongoing removal, fragmentation and deterioration of suitable grassland habitat (Smith and Robertson 1999). Current populations in Victoria persist primarily in the basalt plains to the west of Melbourne, and areas around Ballarat and Bendigo (Hadden 1995; DSE 2011).

Habitat:

The Striped Legless Lizard inhabits lowland native grasslands, typically dominated by native tussock-forming grass species. In Victorian populations, the species frequents habitats with exposed basalt rocks in grassland and areas of cracking clay soils, where the species can seek refuge under rocks and in earth cracks (Dorrough *et al.* 1995).

Although Striped Legless Lizards have been reported from areas of relatively undisturbed native grasslands, with a dense cover of perennial tussock grasses (Kukolic 1991; Kukolic and Osborne 1993), they are also known to inhabit areas of non-native grassland (Smith and Robertson 1999). This has been shown at several sites throughout the Basalt Plains in western Victoria, which are currently grazed at various stock densities (Rohr and Peterson 2003).

Within the study area, there are small remnants of the Ecological Vegetation Class (EVC) Plains Grassland, some of which qualifies as the federally listed community; Natural Temperate Grassland of the Victorian Volcanic Plain. These vegetation communities are strongly associated with Striped Legless Lizard habitat, particularly in areas where there is embedded and surface basalt rock. Other areas of modified grassland habitat which have a higher percentage cover of perennial pasture grasses, may still provide structural habitat characteristics suitable for the species and linkages between higher quality grassland remnants (A. Smith pers. obs.).

2 METHODS

2.1 Nomenclature

The names of terrestrial vertebrate fauna (mammals, birds, reptiles, amphibians) follow the Victorian Biodiversity Atlas (VBA) (DSE 2011).

2.2 Database and Literature Review

The following resources and databases were reviewed:

- The VBA (DSE 2011) and Victorian Fauna Database (VFD) (Viridans Pty Ltd 2011) databases for fauna records;
- The previous consultant report prepared pertaining to the species within the study area (Brett Lane & Associates Pty Ltd 2009);
- The Commonwealth Department Species Profile and Threats Database (SPRAT): Striped Legless Lizard *Delma impar* (SEWPaC 2013);
- The Commonwealth Survey Guidelines for Australia's Threatened Reptiles (SEWPaC 2011a);
- The Commonwealth Referral Guidelines for the vulnerable Striped Legless Lizard *Delma impar* (SEWPaC 2011b); and,
- The Flora and Fauna Guarantee Act Action Statement #17: Striped Legless Lizard *Delma impar* (DSE 2003).

2.3 Targeted Striped Legless Lizard Surveys

The study area has previously been identified as supporting Striped Legless Lizards through targeted surveys (Brett Lane & Associates Pty Ltd 2009; Ecology and Heritage Partners Pty Ltd 2012). In addition, there are several previous records in the local area, including a known population within the Blacks Creek Reserve adjoining the study area west of Stockyard Hill Road (DSE 2011) (Figure 3). Targeted surveys were undertaken to investigate the quality and extent of Striped Legless Lizard habitat within the study area, to inform micro-siting of construction activities and selection of the most appropriate location for resourcing rock within the approved Stockyard Hill Wind Farm.

Targeted surveys for Striped Legless Lizard were conducted in accordance with *Survey guidelines for Australia's threatened reptiles* (SEWPaC 2011a), with additional micro-climate parameters obtained on each survey date as outlined in the *Biodiversity Precinct Structure Planning Kit* (DSE 2010).

Targeted surveys involved the creation of artificial refuge structures, through establishing tile grids in areas of indigenous grassland and in mosaics of indigenous/exotic grassland within the study area. Ecology and Heritage Partners Pty Ltd has successfully used this technique to

survey for Striped Legless Lizard at several sites in western Victoria, including within the study area in 2011/12 (Ecology and Heritage Partners Pty Ltd 2012). The intention of establishing a grid of roof tiles is that individuals will use the artificial habitat for shelter, and to assist in thermoregulation. The set of artificial refuges provide a target for zoologists to focus search attempts in which tiles are lifted to check for the presence of lizards. This survey methodology is widely accepted as the primary survey technique for this species, particularly in areas with surface rock (DSE 2010; SEWPaC 2011a).

Sites were selected based on areas identified as the suitable habitat patches, or areas with the highest likelihood of occurrence, which also achieved a representative spatial sample within the study area (Figure 2). Due to the scale of the study area, with some properties supporting large areas of suitable habitat, site selection was influenced by the potential location of borrow pits. While suitable habitat is present within all properties in the study area, habitat quality varies in extent and quality. Significant portions of the study area are actively cultivated (ploughed and pasture improved or under crop), rendering them unsuitable for the species.

In accordance with *Survey guidelines for Australia's threatened reptiles* (SEWPaC 2011a), as the study area exceeded 30 hectares in size, ten tile grids were established, each consisting of a grid of 5 x 10 tiles (measuring approximately 25 metres x 50 metres). Of the ten tile grids within the study area, four were established in the 2011/12 survey season and an additional six tile grids were laid on either 21 or 28 August 2012 at the following locations (Table 1; Plates 2-11; Figure 2):

Table 1. Location of Tile Grids placed within the study area

Tile Grid Number	Latitude	Longitude
1 [#]	37°31'36.84"S	143°16'38.76"E
6 [#]	37°34'17.16"S	143°14'2.16"E
7 [#]	37°33'24.90"S	143°17'22.50"E
10 [#]	37°33'53.22"S	143°18'48.96"E
11	37° 33' 18"S	143° 17' 54"E
12	37° 33' 49"S	143° 16' 44"E
13	37° 34' 10"S	143° 15' 18"E
14	37° 34' 23"S	143° 15' 48"E
15	37° 34' 25"S	143° 16' 50"E
16	37° 34' 7.2"S	143° 17' 52"E

[#] Denotes tile grid established in previous (2011/12) survey season.



Plate 2: Tile Grid 1 – An extensive rocky rise with modified native grassland located off Geelong Road in private property. Cattle were periodically grazed within the paddock during the assessment period.



Plate 3: Tile Grid 6 – Northern slope of a contiguous rocky ridgeline through this property and neighbouring properties to the east, in the centre of the study area. Modified native grassland lightly grazed by sheep, with extensive surface and embedded basalt rock.



Plate 4: Tile Grid 7 – Rocky rise of modified and introduced grassland, grazed by cattle intermittently throughout the survey period. This ridgeline extends through this property, into neighbouring property to the east.



Plate 5: Tile Grid 10 – Road reserve of Stockyard Hill Road, north of Dunnetts Road. Modified native grassland with embedded and surface rock present and some cracking clay soils. This road reserve is contiguous for several kilometres, with varying grassland quality. Suitable habitat for Striped Legless Lizard occurs to the west (near Black Lake), east (private property supporting extensive rocky rises in this area) and south (Blacks Creek Reserve).



Plate 6: Tile Grid 11 – Area of extensive surface and embedded basalt rock, modified native grassland supporting several moderate cover of common pasture grasses and Cape Weed *Arctotheca calendula*. Inter-tussock space not evident and lack of cracking soils for shelter.



Plate 7: Tile Grid 12 – Part of a large rocky rise between two low lying areas dominated by River Red-gums *Eucalyptus camaldulensis*. Extensive scattered and embedded rock present, with predominantly introduced pasture grasses. Native grasses present throughout, becoming more evident later in the survey season (summer).



Plate 8: Tile Grid 13 – Stony knoll which runs east west through this and neighbouring property. Supports extensive embedded and surface rock, with no evidence of cracking soils. Cover of Cape Weed high at the time of tile establishment, with native tussock cover becoming more apparent through the survey season (summer).



Plate 9: Tile Grid 14 – Rocky rise with extensive surface and embedded rock. Some small areas of cracking soils and native tussock cover, becoming more evident through the survey season, particularly in late December. Cover of Cape Weed and common pasture grasses high at tile establishment.



Plate 10: Tile Grid 15 – Low lying area adjoining property’s southern boundary, near the anemometer tower. Area supports modified native grassland with relatively high native tussock cover and moderate cover of embedded rock. Some surface rock evident, though no cracking soils.



Plate 11: Tile Grid 16 – Low rise with extensive embedded and surface rock. High cover of Cape Weed and common pasture grasses at the time of tile establishment, though native grass cover becoming more evident during the survey season.

Tiles were checked on eight occasions between 3 October 2012 and 21 December 2012, as shown below (Table 2):

Table 2 Tile Survey Dates at Stockyard Hill Wind Farm

Tile Check Number	Date
1	3-4/10/2012
2	15-16/10/2012
3	23-24/10/2012
4	8-9/11/2012
5	14-15/11/2012
6	20-21/11/2012
7	6-7/12/2012
8	21/12/2012

2.4 Assessment Qualifications and Limitations

The tile grid surveys for Striped Legless Lizards were undertaken in accordance with methods recommended by SEWPaC (2011) as far as practicable, with the exception of duration of ‘bed-in’ time for the tiles. The time allowed between tile grid establishment on site and the commencement of tile checks was 7 - 8 weeks (two months), one month short of the recommended timing (SEWPaC 2011). However, it was determined that commencement of tile checks was of greater importance, to increase the likelihood of detecting the species during its active season (spring and early summer) (DSE 2010; SEWPaC 2011).

It is important to note that Striped Legless Lizard can often be difficult to detect even with the use of targeted survey methodologies such as tile grids and active searching, due to the species’ cryptic nature. Other survey methods, such as pitfall trapping, were not used due to the geology of the study area (presence of extensive embedded and surface basalt rock).

The WEF Planning Permit states that “*a survey to identify the exact extent of non-indigenous habitat for the Striped Legless Lizard must be undertaken by a qualified ecologist*”. Whilst detailed habitat assessments have been undertaken within the study area, it is difficult to accurately delineate the boundaries of suitable and unsuitable habitat. This is due to the modified and changing nature of the study area and areas where suitable habitat is interspersed with unsuitable habitat and vice versa. As such, we have employed the precautionary principle when categorising habitat, to ensure that all areas considered likely to support Striped Legless Lizards will be subject to appropriate mitigation measures.

Notwithstanding the aforementioned limitations, it is considered that the survey extent, effort, timing and results presented meet the objectives of the survey and satisfy the WEF Permit No: PL-SP/05/0548, Condition 1.

3 RESULTS

3.1 Database Searches

There are 11 previous records of Striped Legless Lizard within 20 kilometres of the study area, inclusive of two previous records within the study area (Brett Lane & Associates Pty Ltd 2009; DSE 2011, Ecology and Heritage Partners Pty Ltd 2012) (Figure 3). Striped Legless Lizards have been recorded from several locations local to the study area, including within Blacks Creeks Reserve and in private property in Yalla-Y-Poora (Table 3) (Figure 3). The most recent record for each location is shown in Figure 3, as many of these survey sites have several years records attributed to them, resulting from recurrent monitoring (DSE 2011).

During targeted surveys of Stockyard Hill Wind Farm by Ecology and Heritage Partners Pty Ltd (2012) and Brett Lane & Associates Pty Ltd (2009), Striped Legless Lizards were recorded along Stockyard Hill Road, adjacent to Black Lake (Figure 3).

Details of the location and date of records of the species in the local area is provided below (Table 3):

Table 3 Database records of Striped Legless Lizard in the local area (DSE 2011)

Date of most recent record	Distance from study area boundary	Direction from study area	Name of location
2009	14 kms	NW	Ballyrogan
2009	9 kms	W	Yalla-Y-Poora
2004	9 kms	W	Yalla-Y-Poora
2006	9 kms	W	Yalla-Y-Poora
2008	5 kms	Central	Blacks Creek Reserve
2007	5 kms	Central	Blacks Creek Reserve
2004	5 kms	Central	Blacks Creek Reserve
2005	5 kms	Central	Blacks Creek Reserve
1997	15 kms	E	Chepstowe
2005	17 kms	E	Chepstowe
2007	16.5 kms	E	Chepstowe

3.2 Targeted Survey - Striped Legless Lizard

Five Striped Legless Lizards were recorded within the study area during targeted surveys. All five Striped Legless Lizards were recorded at tile grid 10, located in Stockyard Hill Road reserve (Figure 2). They were recorded at this grid on five occasions, with only one individual recorded each occasion (3 and 15 October, 8 and 20 November, and 7 December 2012), (Table 4; Appendix 2). The abundance of individuals observed is in contrast to the previous season, where the highest number of Striped Legless Lizards recorded on one date was 30 November 2011, where 4 individuals were observed at the same location (Ecology and Heritage Partners Pty Ltd 2012). Despite the lower numbers of individuals recorded this second survey season (for this particular location), the site is still considered to support an important population of Striped Legless Lizard. Based on the presence of this population of Striped Legless Lizard, Stockyard Hill Road reserve within the study area is considered to be of national significance (Appendix 1.3).

Four other locally common reptile species, Tussock Skink *Pseudemoia pagenstecheri*, Eastern Three-lined Skink *Bassiana duperreyi*, Eastern Striped Skink *Ctenotus robustus* and Tiger Snake *Notechis scutatus*, were observed during the tile inspections (Table 4; Appendix 2). Additional fauna species observed during tile checks were two frog species: Spotted Marsh Frog *Limnodynastes tasmaniensis* and Southern Bullfrog *Limnodynastes dumerilii* and one mammal species; Fat-tailed Dunnart *Sminthopsis crassicaudata* (Table 4; Appendix 2). Photographs of some species recorded during targeted surveys are shown in Appendix 3.

Fat-tailed Dunnart, a regionally significant marsupial species, listed as near threatened on DSE's Advisory List (DSE 2007), was recorded on five occasions (8, 9, 14 and 20 November 2012) at tile grids 7 and 14 (Table 4; Appendix 2). This species was also recorded during previous tile grid surveys of the study area by Ecology and Heritage Partners Pty Ltd (2012) (Tile Grids 6 and 7; Figure 2) and nearby locations within the wind farm boundary by Brett Lane & Associates Pty Ltd (2009). Preferred habitat for Fat-tailed Dunnart has similar characteristics to suitable habitat for Striped Legless Lizard therefore, this species is often recorded during tile grid surveys where Striped Legless Lizard is the target species.

Table 4: Summary of fauna recorded results for tile grid surveys (October – December 2012)

Grid Number	Survey Occasion and Dates							
	1	2	3	4	5	6	7	8
	3-4/10/12	15-16/10/12	23-24/10/12	8-9/11/12	14-15/11/12	20-21/11/12	6-7/12/12	21/12/12
1	LT	-	-	-	-	-	-	-
6	PP	BD	CR	CR	-	-	-	-
7	-	-	LD	SC x 1	NS	SC x 1	-	-
10	SLL x 1	SLL x 1	BD	SLL x 1	PP, BD	SLL x 1	SLL x 1	-
11	-	LT	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
14	-	-	-	SC x 1	SC x 1	SC x 1	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-

Note: SLL (Striped Legless Lizard); LT (*Limnodynastes tasmaniensis*); LD (*Limnodynastes dumerilii*); BD (*Bassiana duperreyi*); CR (*Ctenotus robustus*); NS (*Notechis scutatus*); PP (*Pseudemoia pagenstecheri*); and, SC (*Sminthopsis crassicaudata*). Only threatened species have abundance provided (i.e. SLL and SC). The remainder of species recorded as presence only.

3.2.1 Habitat assessment

The majority of the study area is modified, as a result of previous land practices (i.e. surface rock removal, cultivation and grazing). However, areas supporting suitable habitat in the form of modified native grasslands, embedded and surface basalt rock and heavy, cracking clay soils are present in several sites within the study area. The likelihood of occurrence for Striped Legless Lizard within the study area varies from known/highly likely to low/unlikely based on the variety of habitat present. An example of a ‘highly likely’ site would be where there is a high percentage cover of indigenous grasses and an abundance of surface and embedded rock (Figure 4). Examples of ‘low likelihood’ habitat can be found in several properties which are actively cultivated and thus support no suitable habitat features (Figure 4).

Both suitable and unsuitable habitat occurs throughout the study area, though suitable habitat largely occurs in disjunct patches of varying quality. Some of the properties have been allocated multiple likelihood ratings of occurrence based on the presence of both suitable and unsuitable habitat. Quality of habitat was dependent upon the features of a ‘patch’, such as presence of indigenous tussock grasses and/or embedded rock. The ratings attributed to the study areas’ likelihood to support Striped Legless Lizard are outlined below:

- **Rating ‘Known’** (Records of Striped Legless Lizard / High quality habitat)
- **Rating ‘High’** (High quality habitat / High likelihood)
- **Rating ‘Moderate’** (Moderate quality habitat / Moderate likelihood)
- **Rating ‘Low’** (Low quality or, no suitable habitat / Low likelihood)

These ratings were allocated based on the presence of the preferred habitat characteristics of Striped Legless Lizard and proximity to current and/or previous records of the species. Within the overall study area, each individual property may be attributed more than one likelihood rating, based on quality of habitat. Where properties have multiple likelihood ratings, a distinct polygon delineating the ‘patch’ of habitat is shown (Figure 4). A summary of the properties which fall into the aforementioned likelihood categories and a description of habitat condition are outlined below (Table 5) and represented in Figure 4. Other habitat features taken into consideration for determining quality are outlined in Appendix A1.4.

Table 5. Habitat condition and ratings assigned to habitat patches within the study area.

Habitat rating	Properties included	General habitat description
Rating 'Known'	Stockyard Hill Road reserve	Rating 1 habitat is defined as a site where Striped Legless Lizard (SLL) was recorded during the present survey, or have previously been recorded within the study area. It supports high quality habitat, with several of the preferred structural characteristics including; native tussock grasses, embedded and surface rock and cracking soils. This habitat is also connected to surrounding high quality habitat and areas where there are historical records (i.e. Blacks Creek Reserve)
Rating 'High'	24, 29, 45, 47, 49, 50	Rating 2 habitats are defined as areas where SLL are considered highly likely to occur but the species has not been recorded. It supports high quality habitat, with several of the preferred structural characteristics including; native tussock grasses, embedded and surface rock and cracking soils. This habitat is generally connected to Rating 1 or Rating 3 habitat.
Rating 'Moderate'	24, 27, 45, 47, 49, 50	Rating 3 habitats are defined as areas where SLL are considered moderately likely to occur. It supports moderate quality habitat, with one or two of the preferred habitat characteristics (i.e. embedded rock, but no native grass cover). This habitat generally adjoins Rating 2 habitat, but is less suitable for SLL.
Rating 'Low'	24, 27, 28, 29	Rating 4 habitats are defined as areas where SLL are considered unlikely to occur. This habitat type is largely cultivated land (i.e. actively cropped or ploughed) and does not support suitable habitat characteristics for SLL. Areas not cultivated that may still fall under Rating 4 are those with no native grass cover, improved (fertilised) soils and little to no surface or embedded rock.

4 LEGISLATIVE IMPLICATIONS OF THE FINDINGS

4.1 Legislative and Policy Implications

This section identifies biodiversity policy and legislation relevant to the proposed development, and principally addresses the:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
- *Wildlife Act 1975* and *Wildlife Regulations 2002*
- *Planning and Environment Act 1987*

4.2 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act establishes a Commonwealth process for assessment of proposed actions that are likely to have a significant impact on matters of National Environmental Significance (NES), or on Commonwealth land. An action (i.e. project, development, undertaking, activity, or series of activities), unless otherwise exempt, requires approval from the Commonwealth Environment Minister if they are considered likely to have an impact on any matters of NES. A referral under the EPBC Act is required if a proposed action is likely to have a ‘significant impact’ on any of the following matters of NES:

- World Heritage properties
- National heritage places
- Ramsar wetlands of international significance
- Threatened species and ecological communities
- Migratory and marine species
- Commonwealth marine area
- Nuclear actions (including uranium mining)
- Great Barrier Reef Marine Park

An action requires approval from the Commonwealth Environment Minister if it will, or if it is likely to, have a significant impact on an endangered or critically endangered species, or on an ‘important population’ or critical habitat of a listed vulnerable species.

Five Striped Legless Lizards, a species listed as Vulnerable under the EPBC Act, were recorded at one tile grid location within the study area during targeted surveys. In addition, the study area supports several other areas of high quality habitat considered likely to support the species.

Implications for the borrow pit development within the Stockyard Hill WEF

The proposed action of creating borrow pit(s) within the wind farm boundary is not considered in the current approved action of construction the WEF (EPBC Approval 2009/4719). It is recommended that an EPBC Act referral to the Commonwealth Environment Minister be prepared for the proposed borrow pit development, as the project has the potential to impact upon a species listed under the EPBC Act.

Where potential Striped Legless Lizard habitat cannot be avoided, it is a requirement of current EPBC Act approval (2009/4719) for construction of the WEF, that SHWFPL submit to the Department for approval, a salvage and translocation plan for relocating Striped Legless Lizards disturbed during construction of the wind farm. This plan must be approved prior to the commencement of works on site and all works in areas of Striped Legless Lizard habitat must follow the approved plan. It is recommended that the Salvage and Translocation Plan prepared for construction of the wind farm incorporate measures for the construction of the borrow pits and be applied across the Wind Farm site and borrow pit areas. Further negotiation regarding management of areas subject to two separate referrals (actions) will be required with SEWPaC and DSE prior to gaining approval of this approach.

4.3 Flora and Fauna Guarantee Act 1988

The primary legislation for the protection of flora and fauna in Victoria is the FFG Act. The Act builds on broader national and international policy in the conservation of biodiversity.

The broad objectives of the FFG Act are to:

- 1) Ensure native flora and fauna survive, flourish and maintain in situ evolutionary potential,
- 2) Manage threatening processes,
- 3) Encourage the conserving of flora and fauna through cooperative community endeavours, and
- 4) Establish a regulatory structure for the conservation of flora and fauna in Victoria.

The Act contains protection procedures such as the listing of threatened species and/or communities of flora and fauna, and the preparation of action statements to protect the long-term viability of these values.

Implications for the borrow pit development within the Stockyard Hill WEF

The targeted surveys recorded Striped Legless Lizards which are listed under the FFG Act. As Striped Legless Lizards were recorded within public land (within Stockyard Hill Road reserve), the proponent (SHWFPL) will be required to obtain a permit to 'impact upon fauna habitat' should any works be required along this area of known habitat.

In addition, the preparation of the Salvage and Translocation Plan for the areas of known, high and moderate quality habitat (Figure 4) within the wind farm development should take into consideration the conservation objectives outlined in the Action Statement for Striped Legless Lizards (Action Statement #17), prepared under the FFG Act by DSE (2003).

4.4 *Wildlife Act 1975 and Wildlife Regulations 2002*

The *Wildlife Act 1975* is the primary legislation in Victoria providing for protection and management of wildlife.

The Act requires people engaged in wildlife research (e.g. fauna surveys, salvage and translocation activities) to obtain a permit under the Act to ensure that these activities are undertaken in a manner consistent with the appropriate controls.

The *Wildlife Act 1975* has the following objectives:

- To establish procedures for the promotion of protection and conservation of wildlife, the prevention of species extinctions, and the sustainable use and access to wildlife; and,
- To prohibit and regulate the conduct of those involved in wildlife related activities.

Wildlife Regulations 2002

The objectives of the Wildlife Regulations are:

- To make further provision in relation to the licensing system established by section 22 of the *Wildlife Act 1975*;
- To prescribe fees, offences, royalties and various other matters for the purposes of the *Wildlife Act 1975*; and,
- To provide for exemptions from certain provisions of the *Wildlife Act 1975*.

Implications and Recommendations

While a permit is generally required for removal of fauna habitat within the study area, this will likely be considered by council when issuing the permit to remove native vegetation under the *Planning and Environment Act 1987*.

Consequently, a separate permit to remove fauna for this project under either the *Wildlife Act 1975* or the *Wildlife Regulations 2002* is unlikely to be required if a permit under the *Planning and Environment Act 1987* is obtained. However, any permit under the *Wildlife Act 1975* will need to be discussed with DSE and is likely to be dependent upon the following:

- Other permits and approvals and the extent of consultation and involvement with DSE; and,

- Extent of salvage and translocation that may be undertaken as part of the proposed development.

As construction within the borrow pit area will likely require the direct removal of Striped Legless Lizard habitat, a Management Authorisation permit for the capture and release of Striped Legless Lizard will need to be obtained prior to any salvage and translocation works within the study area. This Management Authorisation authorises the holder to salvage, temporarily hold or translocate any Striped Legless Lizard captured during construction of the borrow pits. All salvage activities under the permit obtained will need to be in accordance with the Salvage and Translocation Plan, to be prepared to the satisfaction of SEWPaC and DSE.

4.5 Planning and Environment Act 1987

Pyrenees Shire Council

The study area is located within the Pyrenees Shire Council municipality, and there are no overlays within the study area. There is a requirement to apply for a planning permit to undertake stone extraction or create an extractive industry area under Schedule 52.09 of the Pyrenees Shire Council Planning Scheme (DPCD 2013). As part of this schedule, the proponent must have consideration for the potential impact upon flora and fauna values as a result of the proposed action.

Implications for the Proposed Development

A Planning Permit under the Pyrenees Planning Scheme will be required for the purpose of undertaking stone extraction within the bounds of the Stockyard Hill Wind Farm. This planning permit is likely to consider flora and fauna values, and more specifically the potential loss of native vegetation and Striped Legless Lizard habitat. Specific conditions may be put in place, similar to those for development of the wind farm (WEF Permit No: PL-SP/05/0548) in relation to threatened species, namely Striped Legless Lizard.

5 POTENTIAL IMPACTS AND MITIGATION MEASURES

Any loss of habitat for nationally significant fauna species due to the proposed development should be viewed in the overall context of ongoing loss, fragmentation, and deterioration in the quality of remnant grasslands for Striped Legless Lizard throughout the Victorian Volcanic Plain bioregion.

It is understood that SHWFPL, in association with DSE, and input from Ecology and Heritage Partners, will develop management recommendations and contingencies to mitigate/ameliorate potential impacts on Striped Legless Lizard and their habitat in the study area during development of the wind farm. These recommendations and actions will be detailed in the Striped Legless Lizard Salvage and Translocation Plan for the wind farm, to be prepared to the satisfaction of SEWPaC and DSE. This plan is required to be prepared for the study area under the existing Planning Permit granted by the Minister, along with the EPBC Act approval (2009/4719) for development of the wind farm. Given that the ‘borrow pit’ locations occur within the broader wind farm boundary, the details of this plan should be applied to these areas also.

We provide the following recommendations based on the survey results:

- Stockyard Hill Road reserve, which is known to support a population of Striped Legless Lizard (Figure 2 and 4), should be excluded from construction activities as far as practicable. This includes any potential widening of the road, which will impact on known habitat corridor for the species;
- Habitat areas given a Rating ‘High’ (Figure 4) should be subject to micro-siting to avoid Striped Legless Lizard habitat as far as practicable. Further recommendations on the avoidance and minimisation of impacts on habitat will be incorporated into the Striped Legless Lizard Salvage and Translocation Plan;
- All construction works should minimise vehicle movements off formed roads and access tracks within properties where Striped Legless Lizard habitat is identified (Figure 4), to minimise impacts to those habitat areas;
- A qualified herpetologist/zoologist familiar with the capture and handling of Striped Legless Lizard should be present for the disturbance and/or removal of identified habitat to salvage any displaced individuals. Details of the methodology to be employed during construction works will be outlined in the Striped Legless Lizard Salvage and Translocation Plan;
- Zoologists undertaking any capture and relocation activities for Striped Legless Lizard within the study area will be required to obtain a Management Authorisation permit under the *Wildlife Act 1975*, issued by DSE; and,

- Consideration of the regionally significant Fat-tailed Dunnart, also recorded within the study area should be incorporated into any salvage works undertaken within the study area.

6 CONCLUSION

Five Striped Legless Lizards were recorded at a single location along Stockyard Hill Road (tile grid 10), during targeted surveys of ten tile grid locations within the study area. In addition, a total of five Fat-tailed Dunnarts listed as regionally significant were also recorded under tile grids 14 and 7 throughout the survey season (Figure 2).

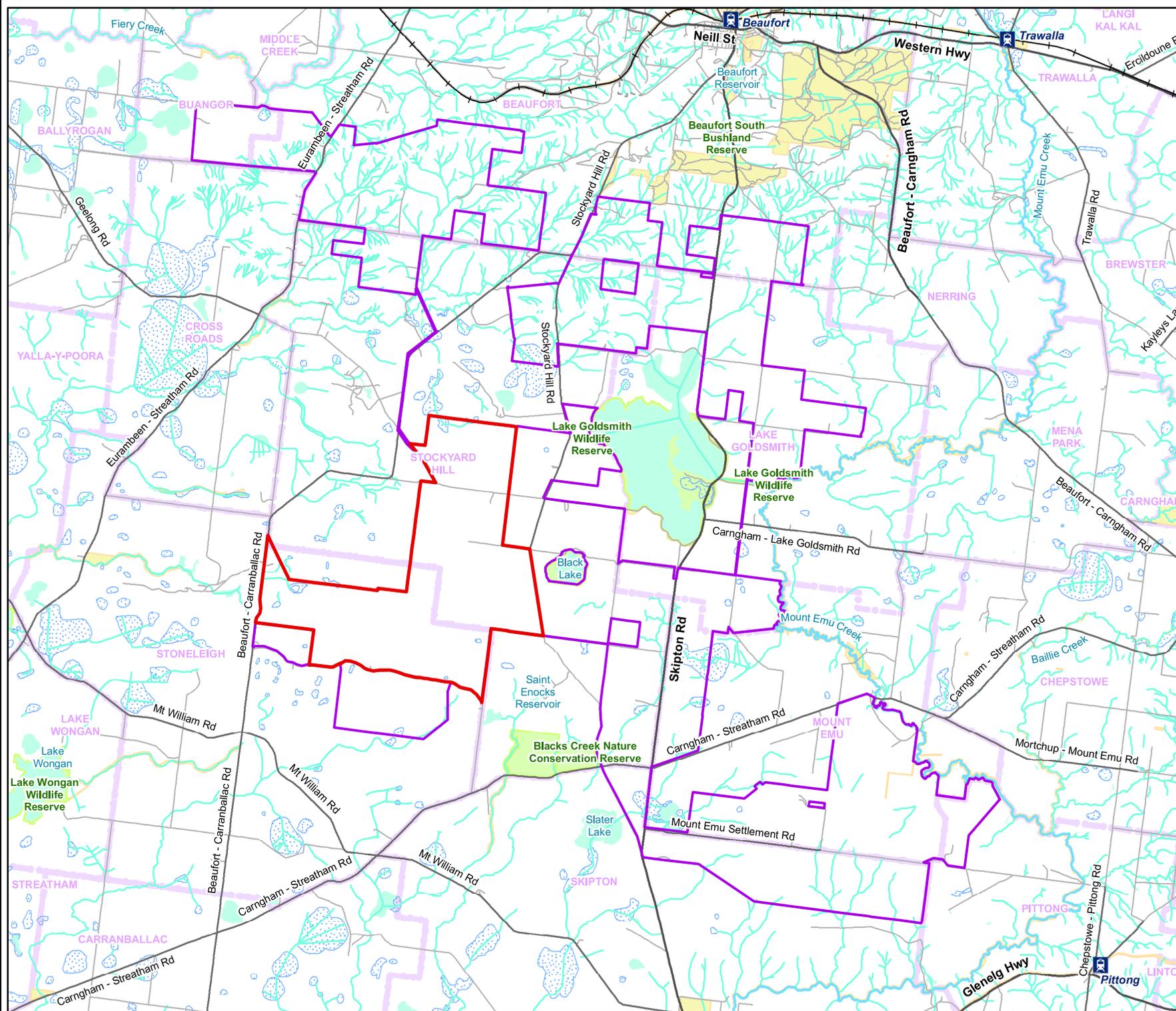
While the study area is largely modified due to historic land use practices (i.e. cultivation and improved pasture), there are large areas of suitable habitat for Striped Legless Lizard. The study area has been subject to habitat assessments in conjunction with targeted survey and subsequently categorised into one of four habitat quality ratings (from known and high quality habitat through to low quality habitat) for the species. These areas have been presented in Figure 4 and will be reflected in the management actions and salvage requirements to be implemented during construction of the borrow pits and remainder of the wind farm development.

The proposed action of creating borrow pit(s) within the wind farm boundary is not considered in either the existing Planning Permit or, the current approved action of construction the WEF (EPBC Approval 2009/4719). It is recommended that an EPBC Act referral to the Commonwealth Environment Minister be prepared for the proposed borrow pit development, as the project has the potential to impact upon a species listed under the EPBC Act.

It is a requirement of current EPBC Act approval (EPBC 2009/4719) for the wind farm that; SHWFPL prepare a Salvage and Translocation Plan for Striped Legless Lizards that may be impacted during construction works. Subject to negotiation and approval from SEWPac, this plan should provide consideration of construction within proposed borrow pit areas as part of the broader wind farm study area, for areas of identified Striped Legless Lizard habitat. In addition, a Management Authorisation under the *Wildlife Act 1975* will need to be obtained prior to implementing such a plan and the commencement of any salvage activities within the Stockyard Hill Wind Farm.

Through implementation of the Salvage and Translocation plan, all construction within the Stockyard Hill Wind Farm development can be planned and undertaken in a manner that does not significantly impact on the local population of Striped Legless Lizard.

FIGURES

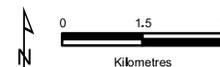


Legend

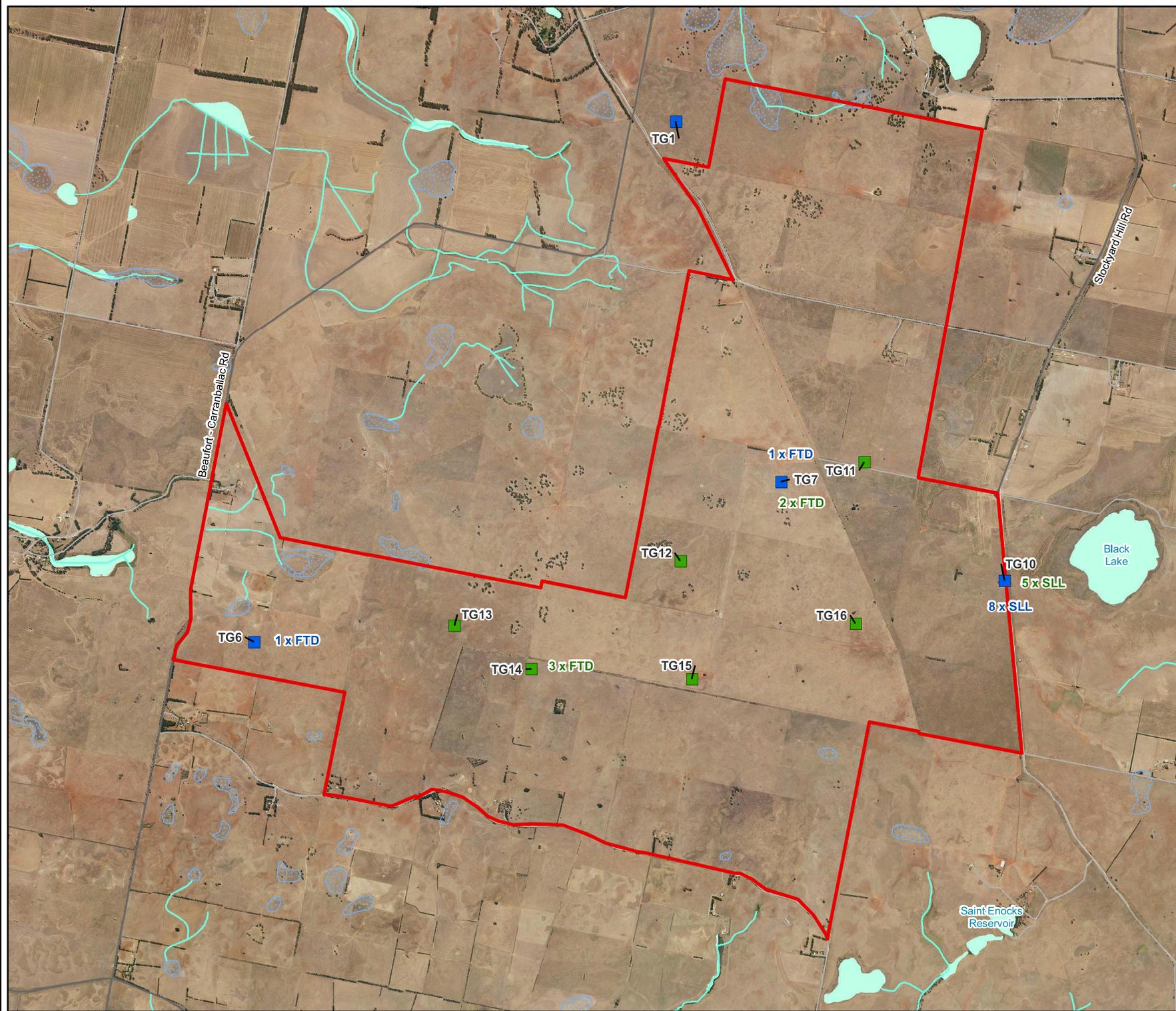
- Study Area
- Stockyard Hill Windfarm Boundary
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Minor Watercourse
- Major Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities



Figure 1
Location of the study area
Targeted Striped Legless Lizard Surveys,
Proposed Stockyard Hill
Windfarm



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



Legend

Study

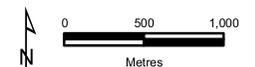
Tile Grid Locations

- Established September 2011
- Established August 2012

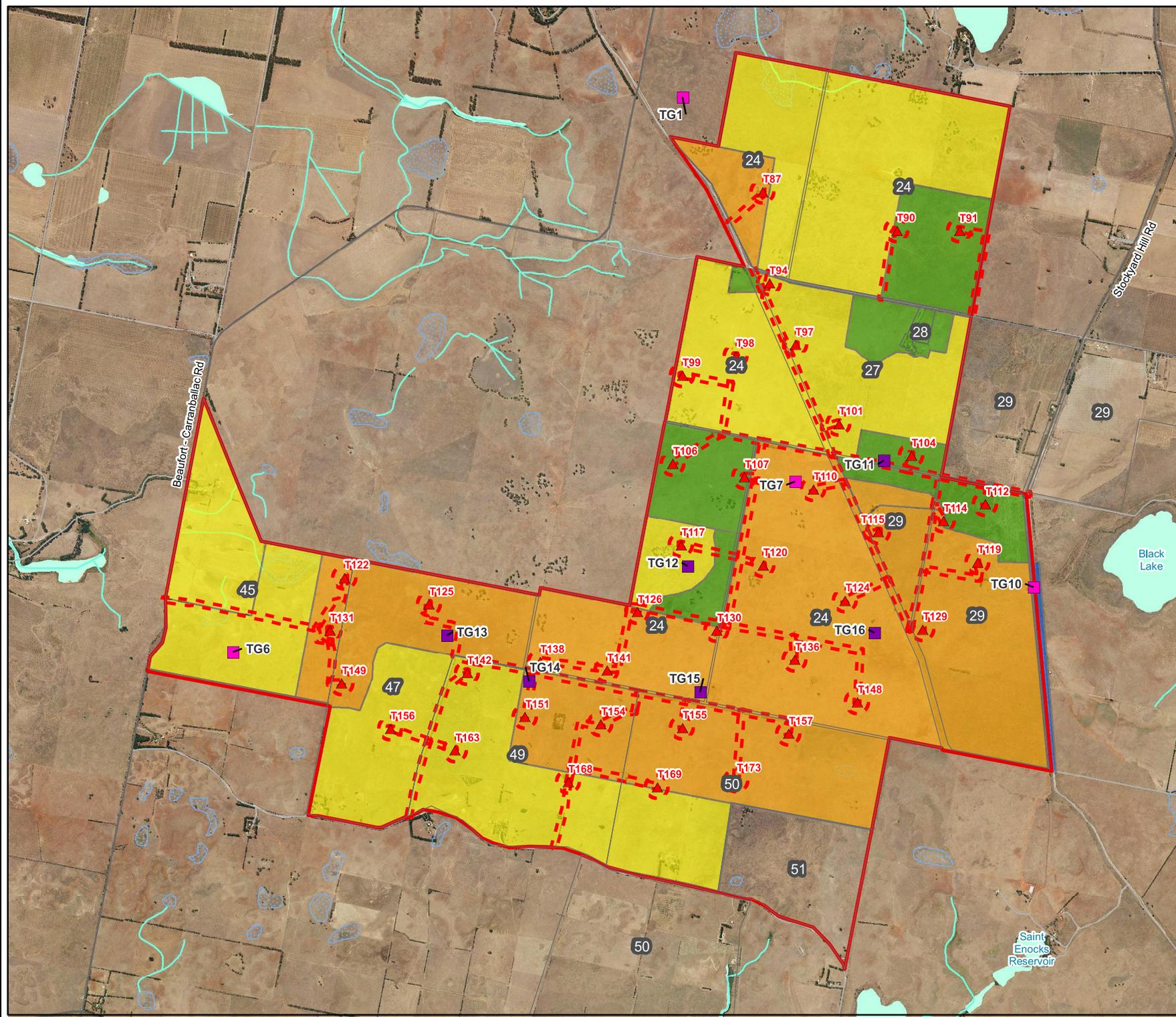
SLL - Striped Legless Lizard. Blue text denotes 2011 record, green text 2012 record.
 FTD - Fat-tailed Dunnart. Blue text denotes 2011 record, green text 2012 record.



Figure 2
Locations of Tile Grids
 Targeted Striped Legless Lizard Surveys,
 Proposed Stockyard Hill Windfarm



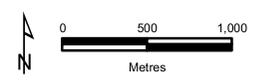
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- Legend**
- Study Area
 - Property Boundaries
 - Tile Grid Locations**
 - Established September 2011
 - Established August 2012
 - Potential SLL Habitat**
 - Known
 - High
 - Moderate
 - Low
 - Permitted - 50m access track
 - ▲ Permitted - Turbines
 - 37** Unique EHP Property Identifier



Figure 4
Locations of Potential Striped Legless Lizard Habitat
Targeted Striped Legless Lizard Surveys, Proposed Stockyard Hill Windfarm



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APPENDICES

Appendix 1 – Significance Assessment

Criteria used by Ecology and Heritage Partners Pty Ltd to define conservation significance, vegetation condition and habitat quality is provided below.

A1.1. Rare or Threatened Categories for Listed Victorian Taxa

Table A1.1. Rare or Threatened categories for listed Victorian taxa.

Rare or Threatened Categories
CONSERVATION STATUS IN AUSTRALIA (Based on the EPBC Act 1999, Briggs and Leigh 1996)
EX - Extinct: Extinct is when there is no reasonable doubt that the last individual of the species has died.
CR - Critically Endangered: A species is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
EN - Endangered: A species is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
VU - Vulnerable: A species is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
R* - Rare: A species is rare but overall is not currently considered critically endangered, endangered or vulnerable.
K* - Poorly Known: A species is suspected, but not definitely known, to belong to any of the categories extinct, critically endangered, endangered, vulnerable or rare.
CONSERVATION STATUS IN VICTORIA (Based on DSE 2005, DSE 2007, DSE 2009)
x - Presumed Extinct in Victoria: not recorded from Victoria during the past 50 years despite field searches specifically for the plant, or, alternatively, intensive field searches (since 1950) at all previously known sites have failed to record the plant.
e - Endangered in Victoria: at risk of disappearing from the wild state if present land use and other causal factors continue to operate.
v - Vulnerable in Victoria: not presently endangered but likely to become so soon due to continued depletion; occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or, taxa whose total population is so small that the likelihood of recovery from disturbance, including localised natural events such as drought, fire or landslip, is doubtful.
r - Rare in Victoria: rare but not considered otherwise threatened - there are relatively few known populations or the taxon is restricted to a relatively small area.
k - Poorly Known in Victoria: poorly known and suspected, but not definitely known, to belong to one of the above categories (x, e, v or r) within Victoria. At present, accurate distribution information is inadequate.

A1.2. Defining Ecological Significance

Table A1.2. Defining Ecological Significance.

Criteria for defining Ecological Significance	
NATIONAL SIGNIFICANCE	
Flora	National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).
	Flora listed as rare in Australia in <i>Rare or Threatened Australian Plants</i> (Briggs and Leigh 1996).
Fauna	National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable).
	Fauna listed as Extinct, Critically Endangered, Endangered, Vulnerable, or Rare under National Action Plans for terrestrial taxon prepared for the SEWPaC: threatened marsupials and monotremes (Maxwell <i>et al.</i> 1996), bats (Duncan <i>et al.</i> 1999), birds (Garnett and Crowley 2000), reptiles (Cogger <i>et al.</i> 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).
	Species that have not been included on the EBPC Act but listed as significance according to the <i>IUCN 2009 Red List of Threatened Species</i> (IUCN 2009).
Communities	Vegetation communities considered critically endangered, endangered or vulnerable under the EPBC Act and considering vegetation condition.
STATE SIGNIFICANCE	
Flora	Threatened taxa listed under the provisions of the FFG Act.
	Flora listed as extinct, endangered, vulnerable or rare in Victoria in the DSE Flora Information System (FIS 2011).
	Flora listed in the State Government's <i>Advisory List of Rare or Threatened Plants in Victoria, 2005</i> (DSE 2005).
	Flora listed as poorly known in Australia in <i>Rare or Threatened Australian Plants</i> (Briggs and Leigh 1996).
Fauna	Threatened taxon listed under Schedule 2 of the FFG Act.
	Fauna listed as Extinct, Critically Endangered, Endangered and Vulnerable on the State Government's <i>Advisory List of Threatened Vertebrate Fauna in Victoria - 2007</i> (DSE 2007).
	Listed as Lower Risk (Near Threatened, Conservation Dependent or Least concern) or Data Deficient under National Action Plans for terrestrial species prepared for the SEWPaC: threatened marsupials and monotremes (Maxwell <i>et al.</i> 1996), bats (Duncan <i>et al.</i> 1999), birds (Garnett and Crowley 2000), reptiles (Cogger <i>et al.</i> 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).

Criteria for defining Ecological Significance	
Communities	Ecological communities listed as threatened under the FFG Act.
	Ecological vegetation class listed as threatened (i.e. endangered, vulnerable) or rare in a Native Vegetation Plan for a particular bioregion (www.dse.vic.gov.au) and considering vegetation condition.
REGIONAL SIGNIFICANCE	
Flora	Flora considered rare in any regional native vegetation plan for a particular bioregion.
	Flora considered rare by the author for a particular bioregion.
Fauna	Fauna with a disjunct distribution, or a small number of documented recorded or naturally rare in the particular Bioregion in which the study area is located.
	A particular taxon that is has an unusual ecological or biogeographical occurrence or listed as Lower Risk – Near Threatened, Data Deficient or Insufficiently Known on the State Government’s <i>Advisory List of Threatened Vertebrate Fauna in Victoria - 2007</i> (DSE 2007).
Communities	Ecological vegetation class listed as depleted or least concern in a Native Vegetation Plan for a particular bioregion (www.dse.vic.gov.au) and considering vegetation condition.
	Ecological vegetation class considered rare by the author for a particular bioregion.
LOCAL SIGNIFICANCE	
Local significance is defined as flora, fauna and ecological communities indigenous to a particular area, which are not considered rare or threatened on a national, state or regional level.	

A1.3 Defining Site Significance

The following geographical areas apply to the overall level of significance with respect to the current survey.

- National:** Australia
State: Victoria
Regional: Victorian Volcanic Plain bioregion
Local: Within 10 kilometres surrounding the study area

Table A1.3. Defining Site Significance.

Criteria for defining Site Significance
NATIONAL SIGNIFICANCE
<p>A site is of National significance if:</p> <ul style="list-style-type: none"> - It regularly supports, or has a high probability of regularly supporting individuals of a taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans for terrestrial taxon prepared for the SEWPaC. - It regularly supports, or has a high probability of supporting, an 'important population' as defined under the EPBC Act of one or more nationally 'vulnerable' flora and fauna taxon. - It is known to support, or has a high probability of supporting taxon listed as 'Vulnerable' under National Action Plans. - It is known to regularly support a large proportion (i.e. greater than 1%) of a population of a taxon listed as 'Conservation Dependent' under the EPBC Act and/or listed as Rare or Lower Risk (near threatened, conservation dependent or least concern) under National Action Plans. - It contains an area, or part thereof designated as 'critical habitat' under the EPBC Act, or if the site is listed under the Register of National Estate compiled by the Australian Heritage Commission. - It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of national conservation significance such as most National Park, and/or a Ramsar Wetland(s).
STATE SIGNIFICANCE
<p>A site is of State significance if:</p> <ul style="list-style-type: none"> - It occasionally (i.e. every 1 to 5 years) supports, or has suitable habitat to support taxon listed as 'Critically Endangered' or 'Endangered' under the EPBC Act and/or under National Action Plans. - It regularly supports, or has a high probability of regularly supporting (i.e. high habitat quality) taxon listed as 'Vulnerable', 'Near threatened', 'Data Deficient' or 'Insufficiently Known' in Victoria (DSE 2005, 2007), or species listed as 'Data Deficient' or 'Insufficiently Known' under National Action Plans. - It contains an area, or part thereof designated as 'critical habitat' under the FFG Act. - It supports, or likely to support a high proportion of any Victorian flora and fauna taxa. - It contains high quality, intact vegetation/habitat supporting a high species richness and diversity in a particular bioregion. - It is a site which forms part of, or connected to a larger area(s) of remnant native vegetation or habitat of state conservation significance such as most State Parks and/or Flora and Fauna Reserves.
REGIONAL SIGNIFICANCE

Criteria for defining Site Significance
<p>A site is of Regional significance if:</p> <ul style="list-style-type: none"> - It regularly supports, or has a high probability of regularly supporting regionally significant fauna as defined in Table 1.2. - It contains a large population (i.e. greater than 1% or 5%) of flora considered rare in any regional native vegetation plan for a particular bioregion. - It supports a fauna population with a disjunct distribution, or a particular taxon that has an unusual ecological or biogeographical occurrence. - It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of regional conservation significance such as most Regional Parks and/or Flora and Fauna Reserves.
LOCAL SIGNIFICANCE
<p>Most sites are considered to be of at least local significant for conservation, and in general a site of local significance can be defined as:</p> <ul style="list-style-type: none"> - An area which supports indigenous flora species and/or a remnant EVC, and habitats used by locally significant fauna species. - An area which currently acts, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape.

A1.4. Defining Habitat Quality

Several factors are taken into account when determining the value of habitat. Habitat quality varies on both spatial and temporal scales, with the habitat value varying depending upon a particular fauna species.

Table A1.4. Defining Habitat Quality.

Criteria for defining Habitat Quality
HIGH QUALITY
High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups).
High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity).
High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat.
Provides known, or likely habitat for one or more rare or threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2007.
MODERATE QUALITY
Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Moderate species richness and diversity - represented by a moderate number of species from a range of fauna groups.
Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes.
Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat.
Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DSE 2007.
LOW QUALITY
Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.
Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups).
Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.
Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes.
Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat.
Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DSE 2007.

Appendix 2 – Tile grid survey results tables

Table A2.1: Summary of results during tile check #1 (3-4/10/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	4/10	8:40	21.4	44.8	3.1	18.2	19.2	13.3		LT
TG6	3/10	11:35	22.5	45.0	0.5	26.3	27.9	14.1		PP
TG7	4/10	9:15	19.7	44.5	2.2	20.6	23.0	12.5		
TG10	3/10	10:25	18.6	62.0	3.0	24.0	26.0	12.2	1	
TG11	3/10	11:05	19.2	58.2	3.3	22.3	25.1	12.8		
TG12	4/10	10:40	22.6	47.7	3.2	19.9	27.5	14.5		
TG13	3/10	12:15	20.6	55.1	3.3	18.6	28.6	15.2		
TG14	3/10	12:30	23.0	57.2	1.9	23.3	25.6	17.3		
TG15	4/10	10:20	22.1	44.6	2.5	21.8	25.1	14.8		
TG16	4/10	9:55	21.5	45.0	2.9	19.6	27.3	13.9		

Table A2.2: Summary of results during tile check #2 (15-16/10/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	16/10	10:05	13.1	79.7	1.7	17.4	16.7	13.0		
TG6	15/10	11:20	22.1	38.3	3.0	23.8	24.6	14.0		BD
TG7	16/10	8:40	12.9	71.1	0.6	13.0	11.5	12.1		
TG10	15/10	12:20	20.6	49.3	2.6	27.1	26.9	12.7	1	
TG11	15/10	11:55	21.4	46.3	1.8	23.3	26.4	13.7		LT
TG12	16/10	9:45	14.3	74.9	0.5	14.4	13.5	12.8		
TG13	15/10	10:25	20.8	49.0	1.7	12.7	25.6	12.8		
TG14	15/10	10:40	19.9	53.6	5.8	17.8	20.9	13.5		
TG15	16/10	9:15	14.2	78.7	2.2	15.3	14.3	12.4		
TG16	16/10	9:00	14.6	77.2	2.4	14.4	12.7	11.9		

Table A2.3: Summary of results during tile check #3 (23-24/10/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	23/10	11:15	18.2	42.3	3.2	20.1	23.0	13.9		
TG6	24/10	9:15	16.0	48.7	1.2	17.3	16.4	13.7		CR
TG7	23/10	10:10	15.1	52.9	0.8	16.6	21.4	12.6		LD
TG10	24/10	10:20	16.1	47.0	1.1	18.1	17.2	13.0		BD
TG11	24/10	9:55	16.9	47.1	1.8	12.1	10.9	11.6		
TG12	23/10	10:55	18.2	50.3	0.7	18.0	22.6	13.3		
TG13	24/10	8:30	16.6	43.9	1.8	14.1	14.9	12.9		
TG14	24/10	8:50	15.5	48.7	0.5	15.3	14.8	12.7		
TG15	23/10	10:40	15.4	53.9	4.2	18.6	25.1	13.0		
TG16	23/10	10:25	16.8	49.2	1.6	20.8	20.4	12.3		

Table A2.4: Summary of results during tile check #4 (8-9/11/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	9/11	10:05	13.5	62.5	4.1	14.6	16.9	15.3		
TG6	8/11	11:00	18.3	76.2	4.8	27.7	26.2	18.5		CR
TG7	9/11	8:30	10.8	62.0	3.9	11.4	12.1	13.1		SC
TG10	8/11	10:00	17.3	75.8	5.1	19.6	20.9	14.7	1	
TG11	8/11	10:25	16.9	76.1	5.0	17.4	17.8	14.7		
TG12	9/11	9:40	12.5	63.5	3.8	12.3	11.8	12.3		
TG13	8/11	11:30	18.3	76.6	4.5	22.3	22.0	16.5		
TG14	8/11	11:40	21.8	76.8	4.2	30.4	27.0	21.8		SC
TG15	9/11	9:15	11.1	63.4	4.3	12.1	11.3	13.3		
TG16	9/11	8:45	8.5	62.5	4.1	11.2	9.5	12.9		

Table A2.5: Summary of results during tile check #5 (14-15/11/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	15/11	11:00	16.2	49.8	3.2	25.4	23.8	18.2		
TG6	14/11	11:00	14.1	35.9	2.4	20.5	19.6	19.3		
TG7	15/11	10:00	13.7	44.8	3.5	22.1	20.1	15.7		NS
TG10	14/11	8:40	12.5	35.2	2.0	18.5	17.7	15.1		PP, BD
TG11	14/11	9:20	13.5	35.9	1.8	20.2	18.5	15.2		
TG12	15/11	10:40	16.5	50.2	4.3	20.2	20.7	17.2		
TG13	14/11	10:10	13.5	36.6	1.6	20.4	22.5	16.6		
TG14	14/11	10:20	13.4	36.2	1.5	20.7	19.5	16.6		SC
TG15	15/11	10:25	15.6	45.1	3.9	22.1	24.2	17.4		
TG16	15/11	10:15	15.5	45.6	3.6	21.6	19.5	17.3		

Table A2.6: Summary of results during tile check #6 (20-21/11/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	21/11	8:10	14.1	52.0	1.4	18.2	17.1	21.9		
TG6	20/11	10:00	22.2	49.0	2.9	25.9	28.1	18.3		
TG7	21/11	8:40	14.7	65.2	1.6	18.3	18.2	18.6		SC
TG10	20/11	10:55	23.6	44.0	1.2	28.6	30.1	17.5	1	
TG11	20/11	10:40	21.1	46.5	2.1	26.1	24.3	19.8		
TG12	21/11	9:25	16.1	67.1	0.6	18.0	19.7	18.5		
TG13	20/11	9:10	21.7	55.0	3.4	21.2	20.8	17.0		
TG14	20/11	9:25	21.8	50.7	2.6	20.6	24.0	17.6		SC
TG15	21/11	9:10	13.3	71.4	1.4	18.7	18.3	19.7		
TG16	21/11	8:50	14.0	72.0	3.2	19.8	17.4	20.2		

Table A2.7: Summary of results during tile check #7 (6-7/12/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	7/12	8:00	16.7	94.1	0.5	16.0	16.1	17.0	1	
TG6	6/12	10:40	16.9	61.0	1.7	19.4	22.6	21.0		
TG7	7/12	9:35	21.4	40.0	1.7	23.1	25.2	19.6		
TG10	7/12	8:50	19.4	60.0	1.1	22.0	23.2	17.2		
TG11	7/12	8:25	16.5	83.0	1.1	18.4	20.0	16.9		
TG12	7/12	10:15	26.3	33.0	2.2	24.4	34.7	21.1		
TG13	6/12	10:15	15.2	66.0	1.6	19.1	20.8	19.1		
TG14	6/12	10:25	15.2	66.1	1.6	20.1	21.2	18.3		
TG15	7/12	10:00	25.0	30.2	2.2	27.0	28.0	21.5		
TG16	7/12	9:45	23.9	38.0	2.0	23.1	32.3	19.0		

Table A2.8: Summary of results during tile check #8 (21/12/2012)

Grid #	Date	Time	Microclimate parameters						Results	
			Ambient Temp °C	Humidity %	Wind m/s	Under tile temp °C	Above tile temp °C	Soil Temp °C	SLL present	Other spp
TG1	21/12	8:40	16.9	58.8	4.1	15.8	14.0	16.2		
TG6	21/12	11:15	25.1	58.1	4.5	26.6	34.3	22.2		
TG7	21/12	9:20	21.7	58.0	4.7	21.9	24.1	18.2		
TG10	21/12	12:15	23.4	57.5	5.1	26.9	29.9	24.9		
TG11	21/12	9:00	16.9	57.5	4.2	20.9	20.0	16.5		
TG12	21/12	10:35	21.0	58.0	4.5	25.9	35.0	18.7		
TG13	21/12	11:40	26.3	58.0	4.7	27.0	35.2	23.1		
TG14	21/12	11:50	26.5	57.8	5.0	27.2	35.1	22.9		
TG15	21/12	10:15	20.9	58.5	4.9	24.2	30.7	24.0		
TG16	21/12	9:50	18.2	57.8	4.7	24.5	33.9	17.6		

Note: SLL (*Striped Legless Lizard*); LT (*Limnodynastes tasmaniensis*); LD (*Limnodynastes dumerilii*); BD (*Bassiana duperreyi*); CR (*Ctenotus robustus*); NS (*Notechis scutatus*); PP (*Pseudemoia pagenstecheri*); and, SC (*Sminthopsis crassicaudata*).

Appendix 3 – Photos of fauna located under tile grids

The following is a selection of photos of fauna species located under tile grids within the study area. All photos © Ecology and Heritage Partners Pty Ltd



Plate 12 Striped Legless Lizard



Plate 13 Striped Legless Lizard



Plate 14 Fat-tailed Dunnart *Sminthopsis crassicaudata*



Plate 15 Striped Legless Lizard



Plate 18 Tussock Skink *Pseudemoia pagenstecheri*



Plate 19 Eastern Striped Skink *Ctenotus robustus*



Plate 21 Eastern Three-lined Skink *Bassiana dupperyi*



Plate 21 Eastern Three-lined Skink *Bassiana dupperyi*