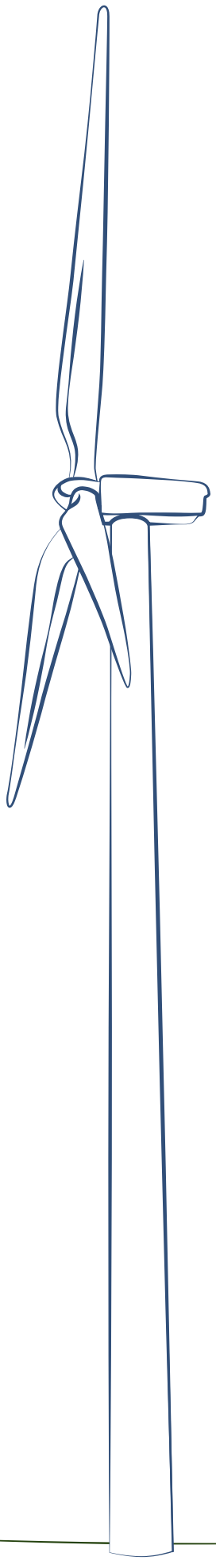

Attachment H

Bat Fauna Assessment

GREG RICHARDS & ASSOCIATES

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AN ASSESSMENT OF THE BAT FAUNA AT THE PROPOSED BODANGORA WIND FARM, VIA WELLINGTON, NSW

Prepared by Dr G.C. Richards

March 2011

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[1] This is a requirement of the consultant's insurance company.

EXECUTIVE SUMMARY

The consultant was commissioned by Infigen Energy to conduct an assessment of the bat fauna at the proposed Bodangora Wind Farm, located approximately 90 km north of the city of Orange, NSW. The general landscape consists of extensive areas of open pasture, interspersed with scattered trees, woodland remnants and creeks.

The bat fauna assessment was designed to obtain baseline data on bat fauna species that were utilising the study area and surrounds, and to target bat fauna species listed in the Schedules of the NSW *Threatened Species Conservation Act, 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*.

Nine sampling sites (three in each of the three major habitats) were monitored with echolocation call detection systems each linked to a device that allowed data to be recorded onto a compact flash card for later analysis. The equipment was powered with large external batteries, which allowed monitoring to be conducted over nine consecutive nights, with calls being recorded from dusk to dawn.

A total of 6184 identifiable echolocation calls were recorded during the nine nights of survey at the nine sampling sites. All nine species were recorded along creeks, eight in woodland remnants, and four in open pasture. The highest level of activity was also recorded along creeks, where 61% of the total calls were observed. The very hot weather during the survey is likely to have increased the focus on this habitat by the bat community. The average number of calls per night per site was 139 at creeks, 85 at woodland remnants, and 5 at open pasture sites. The overall activity was biased to creeks and woodland remnants, with only 142 calls, or 2.3% of the total, being recorded in open pasture.

The only threatened species that was recorded was the Yellow-bellied Sheathtail Bat, which is listed as Vulnerable in the NSW Threatened Species Conservation Act. It was only recorded at the three creek sites, very irregularly, and by just a few calls each night. Two other species that are known from the region that are listed in the TSC Act, the Eastern Bentwing Bat and the Large-footed Myotis, were not recorded during this extensive study.

Impacts upon bat species from wind farm developments include habitat loss or disturbance during the construction phase and once operational, collision of bats with turbines that result in external injury, or air turbulence or pressure effects that result in internal injury (barotrauma). The habitat utilization patterns described above indicate that there could be some impact upon bat populations in general if there was major habitat clearance proposed in remnants or near creeks with water.

However, considering that open areas are usually selected for turbine placement at wind farms elsewhere, if this is the case for the Bodangora project then there is unlikely to be any significant impact on the local bat community
A number of mitigation measures were recommended, including:

- As many open areas as possible should be selected for turbine placement, the vicinity of creeks with water should avoided, and large high quality remnants should be excluded.

- Clearing of mature trees is to be avoided where practical by the project design.

- Consideration be given to monitoring of impacts for the first year of operation.

INTRODUCTION

The consultant was commissioned by Infigen Energy to conduct an assessment of the bat fauna at the proposed Bodangora Wind Farm, located approximately 90 km north of the city of Orange, NSW. The general landscape consists of extensive areas of open pasture, interspersed with scattered trees, woodland remnants and creeks.

Extensive field studies have been conducted in the Orange district by the author, particularly in relation to habitat utilisation patterns of threatened bat species known from the area. This background information led to the Bodangora field assessment being focused on woodland remnants and creeks, known to be core areas for bats.

BACKGROUND INFORMATION

Background information specific to the region included:

- 2001 – Bat fauna monitoring at Wire Gully, Ridgeway Gold Mine (Greg Richards and Associates Pty Ltd 2001)

- 2004 - Bat fauna assessment in infrastructure zones at the Ridgeway mining project (Cadia area) (Greg Richards and Associates Pty Ltd 2005)

- 2006 – Bat fauna assessment of an area extending the southern tailings dam at the Cadia mine (Greg Richards and Associates Pty Ltd 2007)

- 2007 – Assessment of habitat requirements of the Yellow-bellied Sheathtail Bat (within Greg Richards and Associates Pty Ltd 2007) in the south Orange district

- 2007 – Assessment of the bat fauna at a proposed tailings dam to the south of the Cadia gold mine (Richards 2007)

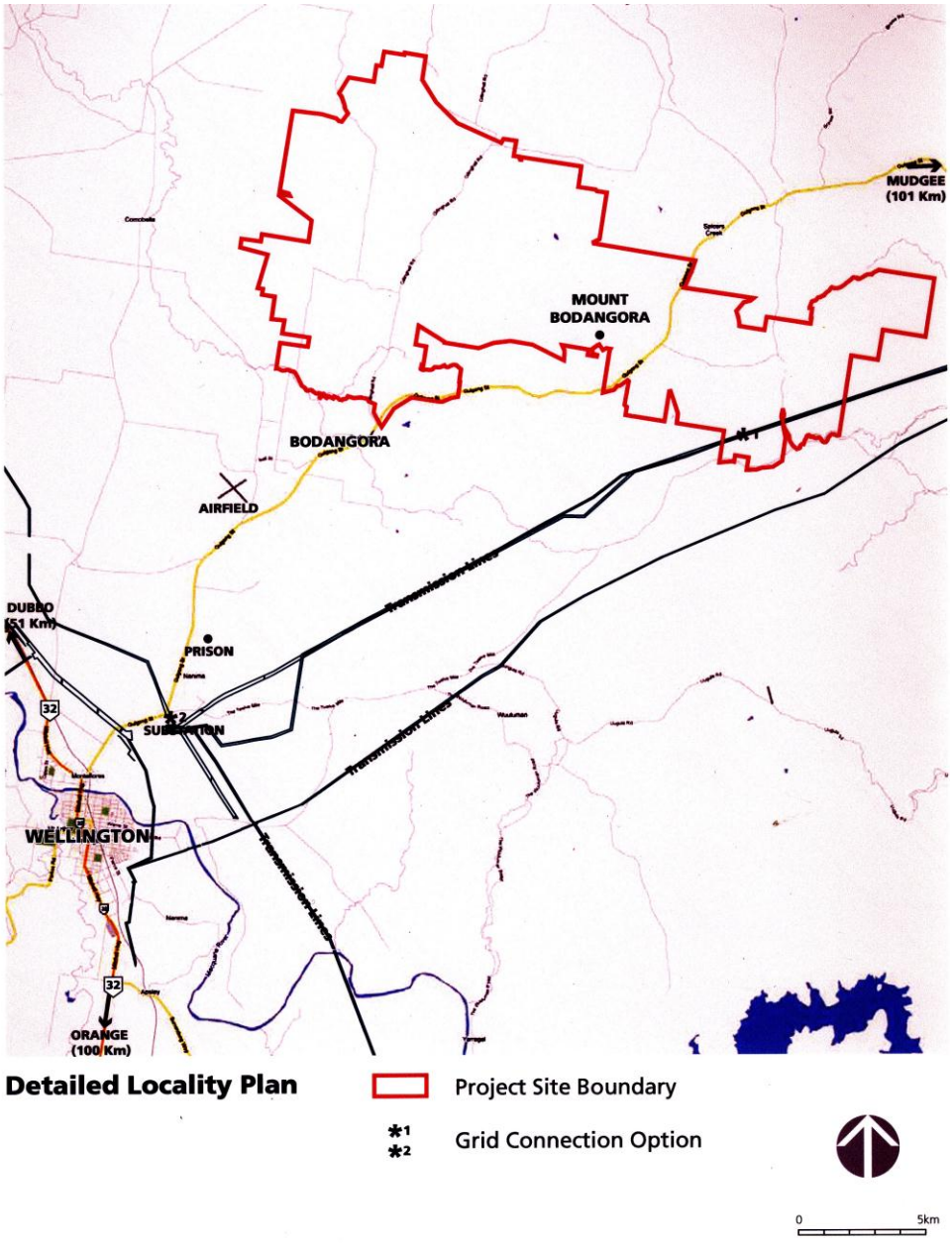
A species list for the region, generated from the background information, is shown in Table 1. This list also includes records from the NSW Wildlife Atlas and the consultant's general database.

Table 1: Bat species recorded in the Cadia – Orange District about 90 km south of the proposed Bodangora Wind Farm. TSC Act = the NSW Threatened Species and Conservation Act, EPBC Act = Environment Protection and Biodiversity Conservation Act, V = listed as Vulnerable, CD = listed as Conservation Dependent. Nomenclature follows Churchill (2008).

Common Name	**Taxon**	**Conservation Status**	
		TSC Act	**EPBC Act**
Sheathtail Bats	**Emballonuridae**		
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	V	-
Freetail Bats	**Molossidae**		
Inland Freetail Bat	*Mormopterus* sp.2	-	-
Southern Freetail Bat	*Mormopterus* sp.4		
White-striped Freetail Bat	*Austronomus australis*	-	-
Ordinary Bats	**Vespertilionidae**		
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-
Chocolate Wattled Bat	*Chalinolobus morio*	-	-
Large Bentwing Bat	*Miniopterus schreibersii*	V	CD
Large-footed Myotis	*Myotis macropus*	V	
Lesser Longeared Bat	*Nyctophilus geoffroyi*	-	-
Gould's Longeared Bat	*Nyctophilus gouldi*	-	-
Little Broadnosed Bat	*Scotorepens greyii*		
Large Forest Bat	*Vespadelus darlingtoni*	-	-
Eastern Forest Bat	*Vespadelus pumilus*		
Southern Forest Bat	*Vespadelus regulus*	-	-
Little Forest Bat	*Vespadelus vulturnus*	-	-

A locality plan for the Proposal is shown in Figure 1.

Figure 1: Locality plan for the proposed Bodangora Wind Farm



METHODS

Survey Strategy

The bat fauna assessment was designed to obtain baseline data on bat fauna species that were utilising the study area and surrounds, and to target bat fauna species listed in the Schedules of the NSW *Threatened Species Conservation Act, 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*. The surveys closely followed the NSW Department of Environment and Conservation *Threatened Biodiversity Survey and Assessment Guidelines* (working draft dated November 2004). These guidelines require a minimum of four consecutive nights of detection, but experience in open and degraded pastures at other wind farm sites led to a longer operating periods (9 nights) being used.

Bat communities were monitored in three major habitats (woodland remnants, creeks and open pasture) and three sampling sites were monitored in each.

Targeted Surveys for Threatened Species

The list of threatened bat species listed in the NSW *Threatened Species Conservation Act, 1995* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* known and/or considered possible occurrences within the wider region was reviewed prior to the study to ensure that appropriate field methods were selected to target threatened species. It was concluded that all of the threatened bat species could be recorded via the electronic detection of echolocation calls.

Electronic Bat Call Detection

Nine sampling sites were monitored with Anabat^{TM} echolocation call detection systems each linked to a device that allowed data to be recorded onto a compact flash card for later analysis. The equipment was powered with large external batteries, which allowed monitoring to be conducted over nine consecutive nights, with calls being recorded from dusk to dawn.

RESULTS AND DISCUSSION

Sampling Sites and Weather Conditions

The location and a brief description of the nine sampling sites are shown in Table 2. The stratification allowed a reasonable sample of the way the local bat community selected habitats, information essential to the design and operation of the wind farm facility.

During the monitoring period (18 – 26 January 2009), weather conditions[2] were suitable for generating a reasonable bat survey. Minimum night temperatures ranged from 12.5-20.1°C, there was very little wind, and negligible rainfall (Table 3).

Table 2: Location and description of the nine sampling sites used in the bat fauna assessment at the proposed Bodangora Wind Farm.

Sampling site	Latitude (S)	Longitude (E)	Habitat description
Creeks			
B-2	32°25.844	148°59.877	Large creek with scattered trees nearby
B-3	32°25.860	149°00.510	Driel Creek, woodland remnant nearby
B-8	32°25.538	149°02.402	Creek with scattered trees and flowing water
Woodland remnants			
B-1	32°25.512	148°59.565	Large remnant, grass understorey, lightly grazed
B-4	32°25.516	149°00.718	Large woodland remnant, detector in gully
B-9	32°26.919	149°02.033	Woodland remnant at edge of highway, dense trees
Open pasture			
B-5	32°27.893	149°00.521	Open paddock with a wooded hill adjacent
B-6	32°26.905	149°00.756	Pasture with a few scattered hollow-bearing trees
B-7	32°27.601	149°01.211	Open pasture with scattered trees

[2] http://www.bom.gov.au/climate/dwo/201101/html/IDCJDW2142.201101.shtml

Table 3: Weather conditions during the bat fauna assessment at the proposed Bodangora Wind Farm.

Date (2011)	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)	3pm wind speed (km/h)
18-Jan	12.5	31.9	0	0
19-Jan	14.8	32.6	0	2
20-Jan	19.8	32.6	0	2
21-Jan	17.5	34.0	0	0
22-Jan	17.9	33.7	0	0
23-Jan	15.6	34.5	0	0
24-Jan	20.1	35.0	0.2	4
25-Jan	18.8	38.2	0	2
26-Jan	19.3	41.8	0	2

Bat Species Recorded

A total of 6184 identifiable echolocation calls were recorded during the nine nights of survey at the nine sampling sites. All nine species were recorded along creeks, eight in woodland remnants, and four in open pasture (Table 4).

The highest level of activity was also recorded along creeks, where a total of 3761 calls were recorded, or 60.8% of the survey total. The very hot weather during the survey is likely to have increased the focus on this habitat by the bat community, as the majority of individuals (all known to roost in tree hollows) would probably needed to drink during the evening. The average number of calls per night per site was 139 at creeks, 85 at woodland remnants, and 5 at open pasture sites.

The overall activity was biased to creeks and woodland remnants, with only 142 calls, or 2.3% of the total, being recorded in open pasture.

Examples of habitat types in the study area are shown in Figures 3 (a-c).

Figure 2: Google Earth image of the proposed Bodangora Wind Farm, showing location of sampling sites.

Table 4: Bat species recorded at the proposed Bodangora Wind Farm during nine nights (18-26 January 2011) of bat call detection.

Species recorded in creeks	**Total calls recorded at each creek site**			**Total for creeks**	**Mean per site**	**Mean per site per night**
	B2	**B3**	**B8**			
White-striped Freetail Bat	46	48	48	142	47.3	5.3
Gould's Wattled Bat	135	157	140	432	144.0	16.0
Chocolate Wattle Bat	137	157	134	428	142.7	15.9
Southern Freetail Bat	108	207	227	542	180.7	20.1
Longeared bats	66	147	113	326	108.7	12.1
Yellow-bellied Sheathtail Bat	6	2	4	12	4.0	0.4
Large Forest Bat	418	489	361	1268	422.7	47.0
Southern Forest Bat	96	134	159	389	129.7	14.4
Inland Forest Bat	90	83	49	222	74.0	8.2
Totals	1102	1424	1235	3761	1253.7	139.3
Species recorded in woodland remnants	**Total calls recorded at each woodland site**			**Total for woodland**	**Mean per site**	**Mean per site per night**
	B1	**B4**	**B9**			
White-striped Freetail Bat	45	44	48	137	45.7	5.1
Gould's Wattled Bat	91	72	83	246	82.0	9.1
Chocolate Wattle Bat	95	116	89	300	100.0	11.1
Southern Freetail Bat	78	128	133	339	113.0	12.6
Longeared bats	43	54	77	174	58.0	6.4
Large Forest Bat	242	232	246	720	240.0	26.7
Southern Forest Bat	68	61	104	233	77.7	8.6
Inland Forest Bat	45	33	54	132	44.0	4.9
Totals	707	740	834	2281	760.3	84.5
Species recorded in open pasture	**Total calls recorded at each open pasture site**			**Total for open pasture**	**Mean per site**	**Mean per site per night**
	B5	**B6**	**B7**			
White-striped Freetail Bat	8	13	23	44	14.7	1.6
Southern Freetail Bat	21	28	28	77	25.7	2.9
Longeared bats	2	9	0	11	3.7	0.4
Large Forest Bat	7	1	2	10	3.3	0.4
Totals	38	51	53	142	47.3	5.3

Figure 3(a): Site B-8, typical creek habitat

Figure 3 (b): Typical woodland habitat

Figure 3(c): Site B-6, typical open pasture habitat with scattered trees

Threatened Species Assessment

The only threatened species that was recorded was the Yellow-bellied Sheathtail Bat, which is listed as Vulnerable in the NSW Threatened Species Conservation Act. It was only recorded at the three creek sites, very irregularly, and by just a few calls each night (Table 5).

It would be considered to be very rare in the project area, which may be related to an apparent requirement for viable populations to only (in this region) be found in very large remnants.

Table 5: Incidence of Yellow-bellied Sheathtail Bat recorded during the survey. All three sites are creek habitat.

Date	Site B-2	Site B-3	Site B-8	Totals
18-Jan	2	-	-	2
19-Jan	-	-	-	-
20-Jan	-	-	4	4
21-Jan	-	-	-	-
22-Jan	-	-	-	-
23-Jan	1	2	-	3
24-Jan	3	-	-	3
25-Jan	-	-	-	-
26-Jan	-	-	-	-
Totals	6	2	4	12

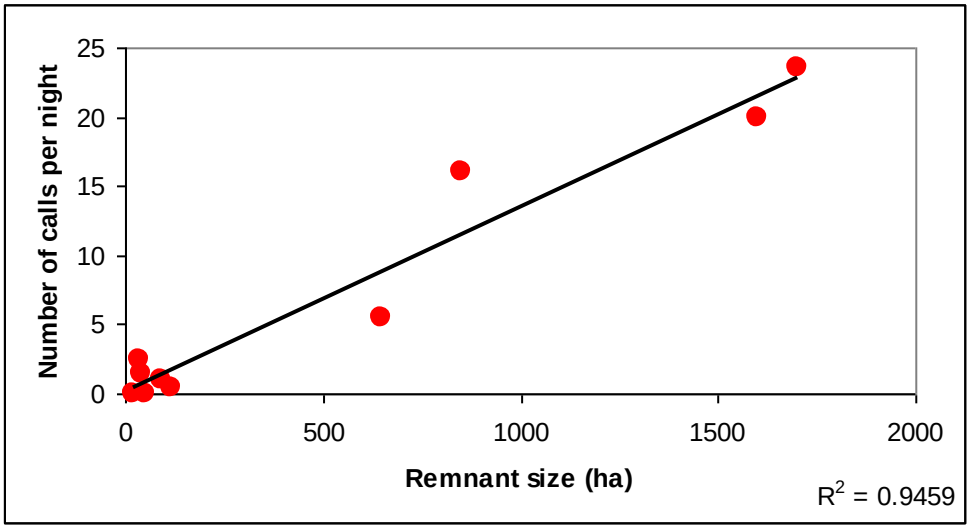
There is extensive information on this species that is available from a study in the Orange District (Greg Richards and Associates Pty Ltd 2005). The purpose of this research was to identify the size of remnants that supported reasonable (and probably viable) populations of this species. Ten woodland/open forest remnants that ranged in size from 20 – 1700 hectares were surveyed in November 2004. The number of Yellow-bellied Sheathtail Bat calls that were recorded is shown in Table 6. Regression analysis showed that the number of calls recorded (which bears some relationship to species relative abundance) was highly correlated ($R^2 = 0.9459$) with the approximate size of the remnants studied (Figure 4).

It can be seen from Figure 7 that for relative abundance to exceed an average of 5 calls per night, then remnant size would need to exceed 650 ha, but to dramatically increase to an average of 16.0 calls per night then remnant size must be 850 hectares or larger. The size of remnants in Bodangora project area is generally less than 50 hectares.

Table 6: Results of a survey of the Yellow-bellied Sheathtail Bat in woodland remnants in the Cadia-Orange District, November 2004.

Remnant location	Approximate remnant size (ha)	Number of Yellow-bellied Sheathtail Bat calls recorded per night
Ashleigh Park – 1	20	0
Ashleigh Park – 2	35	2.5
Ridgeway - Cadialong Dam area	40	1.5
Cadia East Remnant	50	0
Black Mountain	90	1.0
Ridgeway - side of western ridge	115	0.5
Lapstone Hill	650	5.5
Black Rock Ridge	850	16.0
Lees Mountain	1600	20.0
Mount Canobolas	1700	23.5

Figure 4: Relationship between the size of remnants surveyed in the Cadia Valley region in 2004 and the number of Yellow-bellied Sheathtail Bat calls recorded.



This species was expected in the region (Table 1), and it has been recorded at an average of 3.0 – 3.6 calls per night throughout the adjacent Cadia mining lease over a number of years (Greg Richards and Associates Pty Ltd 2005).

Two other species that are known from the region (Table 1) that are listed in the TSC Act, the Eastern Bentwing Bat and the Large-footed Myotis, were not recorded during this extensive study.

The Large Bentwing Bat was recorded infrequently in previous surveys in relation to the gold mining operation at Cadia (approximately 20 km south of Orange, approximately 120 km south of Wellington). Two surveys (Autumn and Spring 2004) were carried out in a large woodland remnant, totaling 56 survey nights and producing 10,018 calls. Only 30 of these were Eastern Bentwing Bats (Richards unpublished). In another survey nearby, in pastureland with scattered trees and small remnants and totaling 40 survey nights that produced 9212 calls, no Eastern Bentwing Bats were recorded (Richards unpublished).

The Large-footed Myotis is a habitat specialist that prefers to forage over smooth-flowing open water, where it forages upon aquatic insects and small fish. Although suitable habitat is present in the project area, and was intensively surveyed (27 nights at creeks), it appears that the project area is well away from the edge of this species' distribution range to the east.

IMPACT ASSESSMENT

Impacts that can potentially occur for bat species from wind farm developments include habitat loss or disturbance during the construction phase and once operational, collision of bats with turbines that result in external injury, or air turbulence or pressure effects that result in internal injury (barotrauma).

The habitat utilization patterns described above indicate that there could be some impact upon bat populations in general (whether threatened species are present or not) if there was major habitat clearance proposed in remnants or near creeks with water.

However, considering that open areas are usually selected for turbine placement at wind farms elsewhere, if this is the case for the Bodangora project then there is unlikely to be any significant impact on the local bat community: only five common species were recorded in this habitat, and only 2% of the overall activity occurred there. It would therefore be prudent to avoid habitat such as creeks and high quality woodland remnants that are ungrazed and have a shrubby understory. Large mature trees with potential roost hollows should be avoided and retained wherever possible. Some clearing of isolated trees may be necessary and in these cases this should be undertaken in conjunction with an appropriate ecologist to ensure no loss of wildlife.

Barotrauma Issues

Considering that echolocating bats can detect moving objects better than stationary ones, and can especially detect small insects, it is difficult to understand why fatalities occur at turbines. It is highly likely that bats that suffer barotrauma (expansion of air in the lungs in zones of low air pressure) do in fact detect a moving turbine blade and swerve to avoid the tip. However, the zone of low pressure at the

tip may extend quite a distance away, due to vortices that occur downwind from the blade.

Baerwald *et al* (2007) examined 87 bat carcasses found beneath turbines, that showed no external injuries. They noted pulmonary haemorrhage and similar lung injuries when the bats were dissected, indicators of decompression. Pressure differences as low as 4 kPa are lethal to Norway rats (Dreyfuss *et al* 1985), and pressure drops at moving turbine blades can be in the range of 5-10 kPa (Baerwald *et al* 2007). Bats have larger lungs and hearts than most other mammals, and have blood-gas barriers that are also much thinner (Maina and King 1984), hence would be more susceptible to barotrauma.

It would seem to be extremely difficult to mitigate for bat barotrauma at any wind turbine, and although currently under development, deterrent devices using ultrasound are not currently available. It would not be possible to re-design blades so that vortices at the tip are reduced, such as seen in the upturned wing tip on Boeing passenger aircraft.

MITIGATION MEASURES

It is recommended that the following measures be adopted for the Bodangora project to mitigate its impact on bat species.

- As many open areas as possible should be selected for turbine placement, the vicinity of creeks with water should avoided, and large high quality remnants should be excluded. This strategy would aid in the reduction of fatalities of not only bats, but birds as well.

- Clearing of mature trees is to be avoided where practical by the project design.

- Where clearing of mature trees cannot be avoided then a suitably qualified specialist should be consulted to develop an appropriate tree clearance protocol to reduce potential wildlife injuries and fatalities.

- Consideration be given to monitoring of impacts for the first year of operation.

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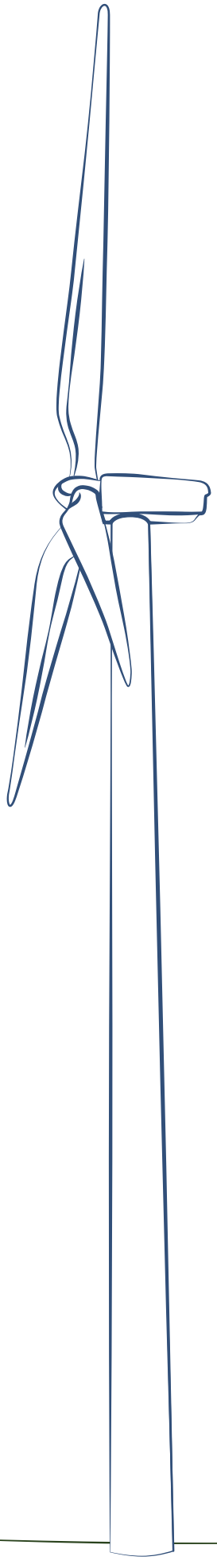

Attachment I

European & Aboriginal Cultural Heritage Assessment Report

NEW SOUTH WALES

ARCHAEOLOGY

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Proposed Bodangora Wind Farm
European and Aboriginal Cultural Heritage Assessment Report

A report to Bodangora Wind Farm Pty Ltd

December 2011

Proponent: Infigen Energy
Local Government Area: Wellington Valley Shire

Julie Dibden - New South Wales Archaeology Pty Limited

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EXECUTIVE SUMMARY

New South Wales Archaeology Pty Ltd has been commissioned by Infigen Energy to undertake an archaeological and cultural heritage assessment of the proposed Bodangora Wind Farm. Both Aboriginal and Non-Aboriginal heritage is considered in this report.

Bodangora is located approximately ten kilometres north-east of Wellington in central western New South Wales. The proposal would involve the installation and operation of between 35 - 40 wind turbine generators. The turbines would be placed on five private properties which are currently utilised for farming.

The proposed wind farm is defined as a Major Project under Part 3A of the Environmental Planning and Assessment Act 1979. This report addresses the Director-General's requirements (DGRs) for the preparation of the Environmental Assessment and documents the assessment process, findings, interpretation of results and recommendations.

The assessment has been conducted in accordance with the NSW Office of Environment and Heritage's (OEH 2011) *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW, Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (NSW DECCW 2010a) and the NSW Heritage Manual.

A process of Aboriginal community consultation has been undertaken as a component of this assessment, and has been conducted in accordance with the guidelines as set out in OEH's *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW DECCW 2010b). The process of consultation has been compliant with the *Interim Guidelines for Aboriginal Community Consultation - Requirements for Applicants* (NSW DEC 2004) in accordance with the provisions of the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW DEC 2005). It is noted in particular that there were no late registrations of interest, but had there been, they would have been accommodated within the process of consultation. Attempts were made to consult with the Wellington Local Aboriginal Land Council, however, at the time the study was conducted the organization was not functioning.

In regard to Indigenous heritage, the study has sought to identify and record Aboriginal cultural areas, objects or places, to assess the archaeological potential of the proposal area, and to formulate management recommendations based on the results of the background research, field survey and a significance assessment.

A search of the OEH Aboriginal Heritage Information Management System (AHIMS) has indicated that there are ten previously recorded Aboriginal objects located within the site search area, none of which, however, are located within the area of proposed impacts (AHIMS #31940: 15th September 2010). A review of previous cultural heritage assessments conducted in the region has been conducted. No heritage areas, objects or places were identified to be present in the proposed activity areas as a result of this review.

A cultural heritage and archaeological survey for Aboriginal areas, objects and places has been conducted in the proposed activity areas. This work was undertaken in August 2011. No Aboriginal areas or places of cultural significance were identified in the proposed activity areas. However, one Aboriginal object locale containing stone artefacts (SU3/L1), and another in which a possible stone procurement area (SU18/L1) is situated, were recorded. No heritage areas, objects or places were identified as a result of the process of Aboriginal community consultation undertaken for this project.

It is recommended that Aboriginal object site SU18/L1 is exempt from all impacts relating to the proposal.

The proposed impact areas are located on landforms and terrain which is highly amorphous and generally undifferentiated in character. During the field survey no landforms (or areas within landforms), were identified that are likely to have been environmental focal points that Aboriginal people would have habitually occupied and, hence, which would result in high density concentrations of artefacts. In addition, biodiversity is assessed to be relatively low, and water sources are ephemeral. Accordingly, Aboriginal use of this landscape is predicted to have been sparse, of low intensity, and restricted to a limited range of activities; - movement through country, hunting and gathering forays and so on. These types of activities would have resulted in artefact discard which is patchy and low density in distribution.

Accordingly, it is concluded that the proposed impacts to the archaeological resource can be considered to be of low impact. It is also relevant to take into consideration that impacts will be discrete in nature and will occupy a relatively small footprint. The archaeological resource in the broader area (those areas which lie outside actual proposed impacts) will not sustain any impacts as a result of the proposal. The Aboriginal representatives of the registered Aboriginal parties who participated in the field survey, and the archaeological consultants, conclude that there are no Aboriginal cultural heritage constraints to the proposal.

No Survey Units have been identified in the proposal area to warrant subsurface test excavation. Based on a consideration of the predictive model applicable to the environmental context in which impacts are proposed, sub-surface Aboriginal objects with potential conservation values are not predicted to have a high probability of being present (cf. NSW DECCW 2010: 24). The environmental contexts in which the turbines (and associated impacts) are proposed, contain eroded and disturbed soils as a result of moderate levels of environmental degradation. Soils across the proposed activity areas are either absent and skeletal (ie lithosols) or very shallow, *that is*, there is **no** subsurface potential in the majority of proposed impact areas. Furthermore, proposed impacts are small-scale, discrete and primarily narrow, linear impacts. In addition, it is considered that in regard to the archaeology itself, subsurface testing is unlikely to produce results much different to predictions made in respect of the subsurface potential of these landforms. Accordingly, a program of subsurface testing undertaken within the impact assessment and planning phase of the project is not considered to be necessary or warranted.

Searches of historical databases have been conducted to determine whether or not Non-Aboriginal heritage items are present in the proposed activity area. The search of the *State Heritage Inventory* (7 October 2010) revealed that the 'Bodangora Gold Mine Former Remains – Chimney, Shaft and Engine Footings' and 'St. Paul's Catholic Church' at Bodangora are listed on the Wellington heritage schedule in the *Local Environmental Plan 1995 – (Rural)*. The Sandy Hollow to Maryvale Railway Line is also listed on the Wellington heritage schedule. St Paul's Catholic Church is also listed as Indicative Place on the *Australian Heritage Database*.

The Bodangora heritage items are located outside proposed impact areas. However, the Sandy Hollow to Maryvale Railway Line traverses the central wind farm area. This line is currently used as a farm road in the *Glen Oak* property. It is proposed that road would be used for access to the wind farm. The proposed impact to the railway/road would be negligible. Nevertheless, a Statements of Heritage Impact has been prepared in respect of this item.

This assessment has been conducted by Julie Dibden and Andrew Pearce, NSW Archaeology Pty Ltd. We gratefully acknowledge the assistance provided to NSW Archaeology Pty Ltd during the course of this project by the following people:

- Dot Stewart and Jamie Gray, Binjang Wiradjuri Aboriginal Heritage Surveys;
- Helena Stanley, Mr Stanley and Wayne Carr, Wellington Valley Wiradjuri Aboriginal Corporation;
- Frank Boland, Infigen; *and*
- Rex England, *Panorama*, Angus Gregory, *Landsgrove*, and Simon Barton, *Glen Oak*.

We would in particular like to acknowledge and pay our respects to the traditional owners of the country which is encompassed by the proposal.

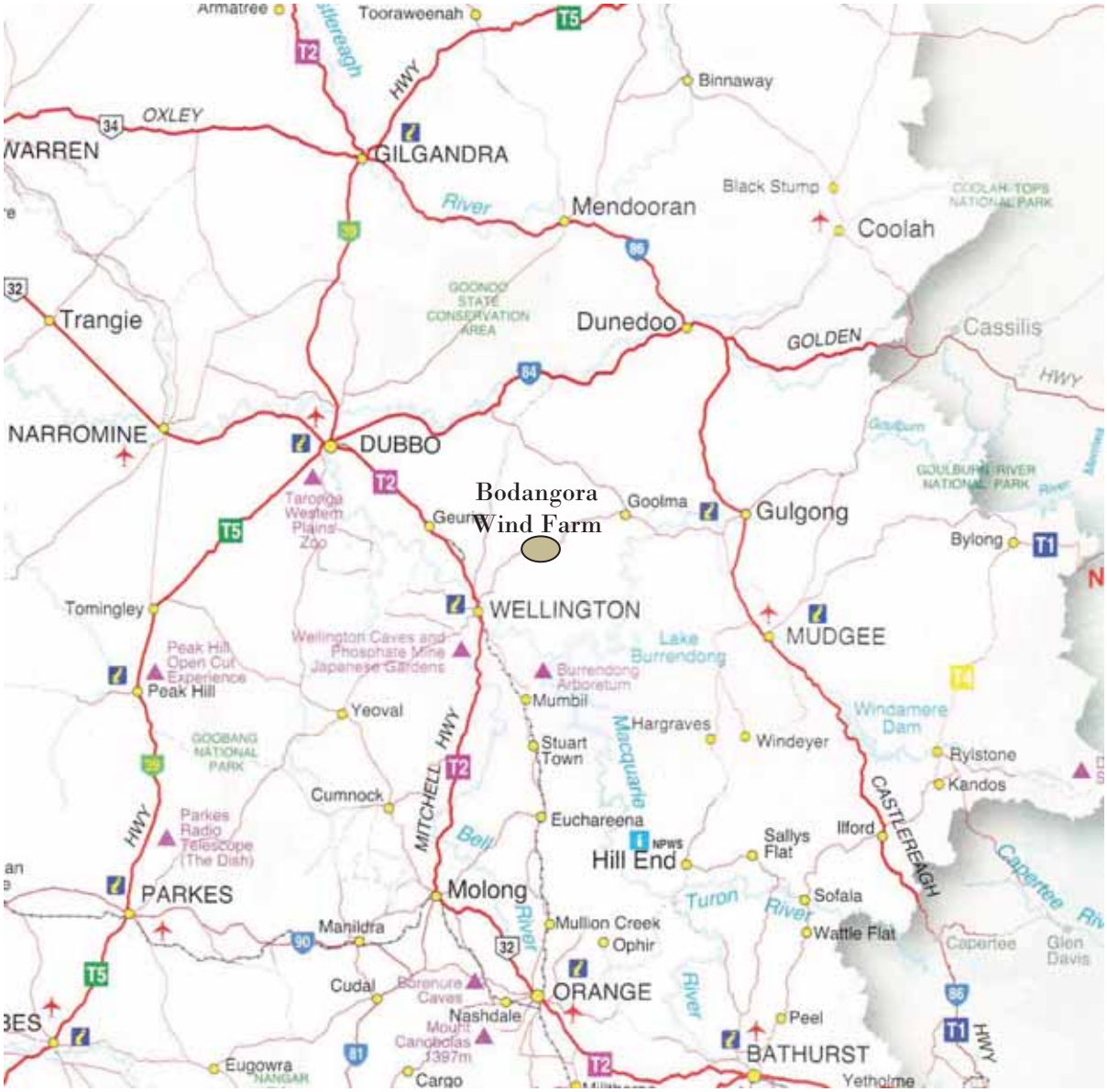

Figure 1 Location of the proposed Bodangora Wind Farm in a regional context.

1. INTRODUCTION

1.1 Introduction

This document describes the cultural heritage assessment undertaken in respect of the proposed Bodangora Wind Farm. The proponent is Bodangora Wind Farm Proprietary Limited, a company formed specifically for this project. The parent company, Infigen Energy Pty Ltd, is the largest wind farm owner/operator in Australia.

The Bodangora Wind Farm would be located approximately ten kilometres to the north-east of Wellington, New South Wales (Figure 1). The proposal would involve the construction and operation of up to 30 - 40 wind turbines generators (Figures 2 and 3). The turbines would be located on private properties which are currently utilised for farming.

The Bodangora Wind Farm would produce approximately 110 MW of renewable energy which would be exported to the existing 132 kV Transgrid transmission line that runs between Wellington and Beryl.

The proposed wind farm is defined as a Major Project under Part 3A of the Environmental Planning and Assessment Act 1979. The Director General, Department of Planning, has issued requirements for the preparation of an Environmental Assessment in which it is stated that an archaeological and cultural heritage assessment is required to be prepared which addresses the potential impact of the proposal on Aboriginal and Non-Aboriginal heritage values.

The objective of the assessment is to address the DGR's for Aboriginal and Non-Aboriginal Heritage.

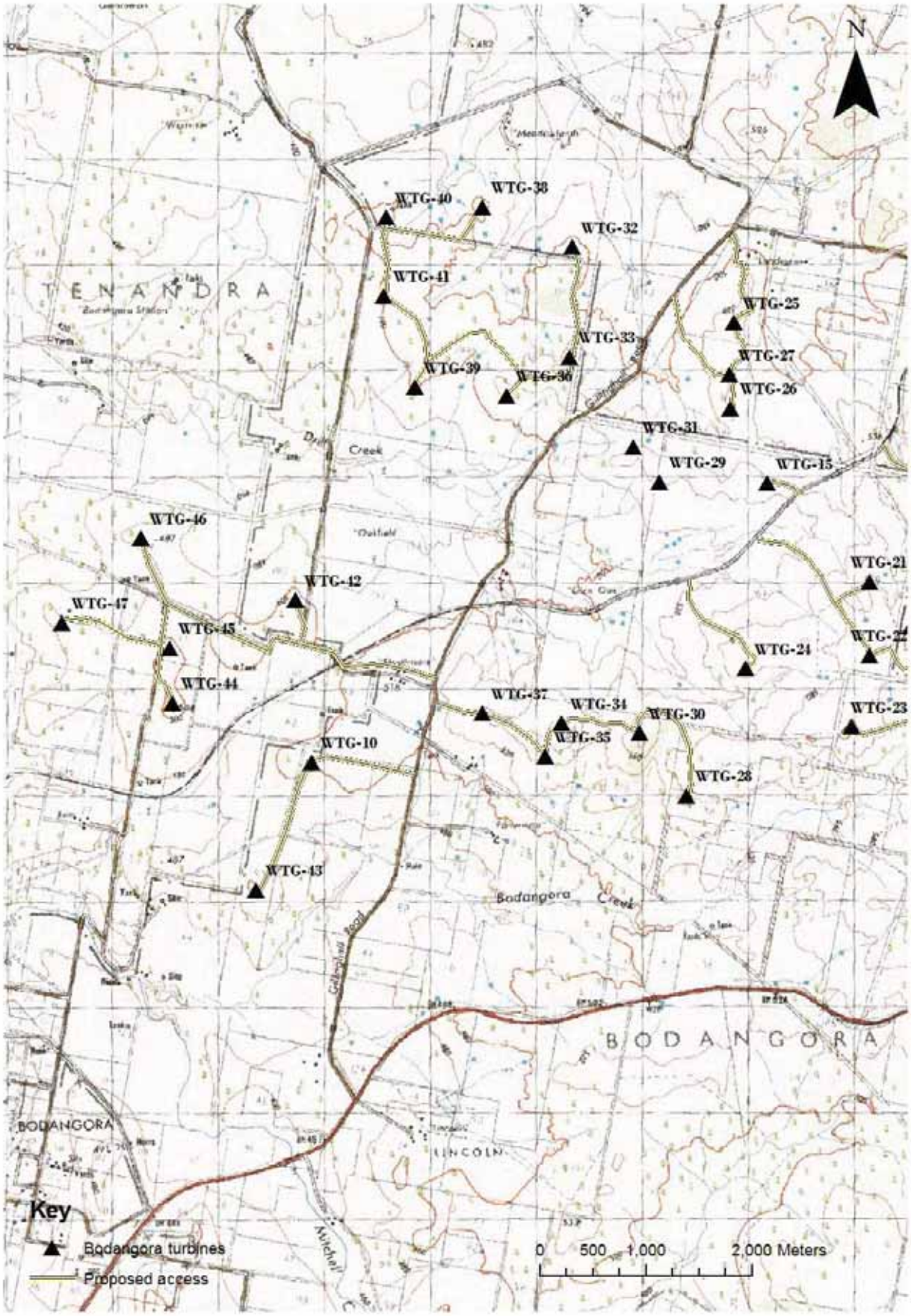

Figure 2 Layout of the proposed wind farm (western area) showing boundaries and geographic extent (compiled with GIS provided by the proponent using mapping from *Topoview Raster 2006* NSW Dept of Lands).

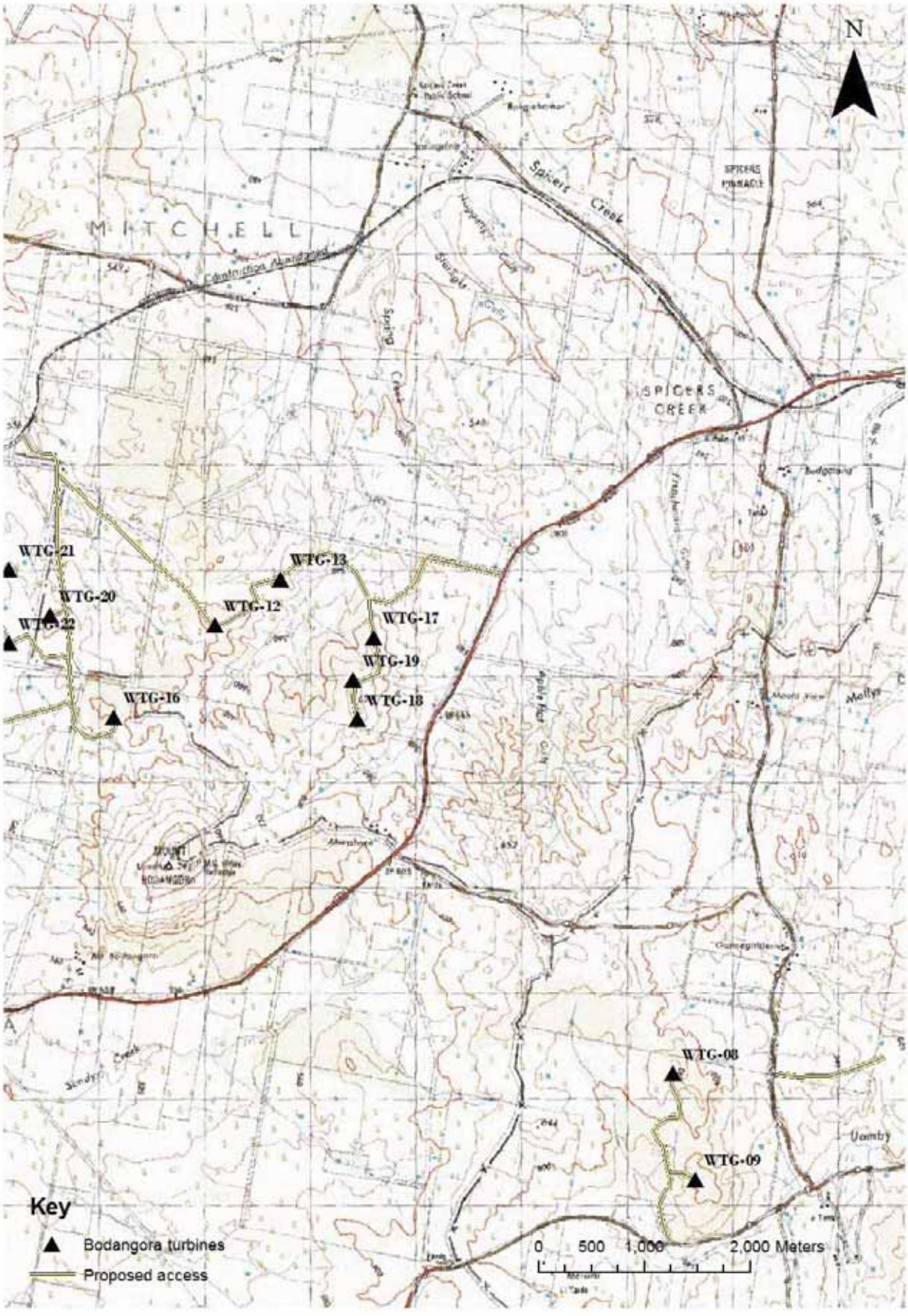

Figure 3 Layout of the proposed wind farm: eastern area.

2. CONSULTATION PROCESS

The Aboriginal consultation undertaken for this project has been conducted in accordance with the OEH's *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW DECCW 2010b).

The process of consultation has been compliant with the *Interim Guidelines for Aboriginal Community Consultation - Requirements for Applicants* (NSW DEC 2004) in accordance with the provisions of the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW DEC 2005). It is noted in particular that there were no late registrations of interest, but had there been, they would have been accommodated within the process of consultation. Attempts were made to consult with the Wellington Local Aboriginal Land Council, however, at the time the study was conducted the organization was not functioning.

2.1 Consultation

In order to identify, notify and register Aboriginal people who may hold cultural knowledge relevant to determining the cultural significant of Aboriginal objects and/or places in the area of the proposed project the following procedure was implemented:

Written notification dated 8th September 2010, requesting a list of Aboriginal groups or persons who may have an interest in this project, was forwarded to the following bodies:

- OEH (formally DECCW) ECP Dubbo office
- Wellington Local Aboriginal Land Council (this letter was returned to sender)
- Office of the Registrar, Aboriginal Land Rights Act 1983
- the National Native Title Tribunal, requesting a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements
- Native Title Services Corporation Limited (NTSCORP Limited)
- Wellington Shire Council
- the Central West Catchment Management Authority, requesting contact details for any established Aboriginal reference group.

In addition an advertisement was placed in the 10 September 2010 edition of the Wellington Times. The closing date for registration of interest was noted as 24 September 2010.

Following communication received from the NSW DECCW and the Central West Catchment Management Authority written notification of the project was forwarded to the following:

- Mr Neville Williams
- Mr Peter Peckham
- Mr Robert Clegg of behalf of the Wiradjuri Council of Elders
- Ms Violet Carr and Mr Neville Brown, Aboriginal Reference Group, Central West Catchment Management Authority

In response to the notifications outlined above, three groups registered an interest in the project. However, because some registered Aboriginal parties did not wish their details to be generally disclosed they are not listed in this report. Instead their details have been forwarded to OEH (DECCW) in correspondence dated 13th October 2010. This correspondence also contained copies of letters of notification, advertisement and assessment process and methodology documents.

An outline of the scope of the project, the proposed cultural heritage assessment process and the heritage assessment methodology was forwarded to the various parties and/or individuals on

varying dates, immediately following receipt of their registration of interest. No responses were received from registered parties in regard to the consultation process and methodology. No cultural information relating to the proposal area was received.

For review and comment, a copy of this draft report was forwarded to the registered parties. No response has been received regarding the draft report from the registered Aboriginal parties (as of 16/12/11).

3. DESCRIPTION OF PROPOSED ACTIVITY

A full description of the proposal and its potential impact on the landscape and heritage resource is described below.

The wind farm will have a capacity of up to 110 megawatts (MW), depending on the capacity of the turbines. The output of the wind farm would be connected to an existing 132kV transmission line. The impacts relating to the construction of the proposed Bodangora Wind Farm will result from the installation of up to 40 wind turbines and associated infrastructure, including an on-site underground electrical cable network, overhead powerline, and a substation.

Site access roads would be required for construction and subsequent operation and maintenance. Where farm roads currently exist, these would be used. Turbine installation requires a footings area which typically measure ca. 15 x 15 m. However, a larger hardstand measuring approximately 45 x 45 m is generally prepared adjacent to each wind turbine for use by cranes during construction. A combination of overhead and underground electricity cabling would be used. The underground cable routes would generally be between the turbines, and where possible, would follow the route of the internal access roads.

The proposed works entail ground disturbance and, accordingly, the construction of the wind farm has the potential to cause impacts to any Aboriginal objects, areas and places, or Non-Aboriginal items which may be present within the zones of direct impact. Impacts will be generally confined to cleared areas currently utilised for grazing and cultivation and, where possible, existing access roads will be used for site access. Electrical connections and communications cabling will be installed adjacent to, or within access roads.

The proposed impacts are discrete in nature and will occupy a relatively small footprint within the overall area. Accordingly, impacts to the archaeological resource across the landscape can be considered to be partial in nature, rather than comprehensive.

4. DESCRIPTION OF THE AREA

In this section of the report the subject area is defined and described.

4 .1 Location and Physical Setting

The subject area is located in the Parishes of Bodangora, Mitchell, Tenandra and Wondaby, Zone 55, in the Wellington Valley Shire.

The proposed wind farm is located between grid references 688000 – 705000 (eastings) and 6406000 – 6417000 (northings). The area is approximately ten kilometres north-east of Wellington, in central western New South Wales.

The layout of the project is shown in Figures 2 and 3. The majority of the proposed turbines are located in a broad area measuring c. 11 kilometres east/west, and six kilometres north/south. This envelope is situated to the north, north-west and west of Mt Bodangora. Two additional turbine sites are located to the south-east (see Figure 3), and the proposed substation is also situated in that area, adjacent to the existing Transgrid 132 kV transmission line.

4.2 Landscape

A consideration of the landscape is necessary in archaeological work in order to characterise and predict the nature of Aboriginal occupation across the land. In Aboriginal society, landscape could be both the embodiment of Ancestral Beings and the basis of a social geography, and economic and technological endeavour. The various features and elements of the landscape are/were physical places that are known and understood within the context of social and cultural practice.

Given that the natural resources that Aboriginal people harvested and utilised were not evenly distributed across landscapes, Aboriginal occupation, and the archaeological manifestations of that occupation, will not be uniform across space. Therefore, the examination of the landscape and environmental context of a study area is valuable for predicting the type and nature of Aboriginal materials and locales which might be expected to occur. Factors which typically inform the archaeological potential of a landform include the presence or absence of water, animal and plant foods, stone and other resources, the nature of the terrain and the cultural meaning associated with a place.

Additionally, geomorphological and humanly activated processes need to be defined as these will influence the degree to which archaeological materials may be visible and/or conserved. Land which is heavily grassed will prevent the detection of archaeological material while land which has suffered disturbance may no longer retain artefacts or stratified deposits. A consideration of such factors is necessary in formulating site significance, and mitigation and management recommendations.

Plate 1 Typical topography of the proposal area. Photo taken on *Glen Oak* looking south towards Wind Turbine Generator (WTG) site #24 in distance.

The broader landscape in which the areas of impact are situated is predominantly comprised of gently rolling hills incised by low order drainage lines (Plate 1). The landform elements present in the study area include open depressions, simple slopes, and crests which have gradients that range between very gentle to moderate. The highest elevation in the wider area is 743 m AHD at Mt Bodangora (see Figure 3).

The area is located within the Macquarie River catchment. Mitchell Creek drains north-west from the land, south and west of Mt Bodangora. Spring Creek, a minor tributary of Spicers Creek, drains northward. The central area is drained by Drill and Mullion Creeks. In the far south-eastern corner of the area, minor creeks drain to the nearby Cudgegong River. All drainage lines in the development envelope are ephemeral first to third order tributary streams.

The district in which the wind farm is located is on the eastern edge of the Lachlan Fold Belt and is underlain by sedimentary and granite rock. In areas where granite occurs, it can outcrop as boulders, especially on crest landforms (Plate 2) or broad, low pavements (Plate 3). A small pocket of basalt occurs on *Glen Oak*. The remainder of the proposal area is sedimentary shales. The soils on the shale are skeletal lithosols, while elsewhere gravelly loams are present.

Plate 2 Granite outcrops near WTG site #34.

The area is in the South Western Slopes Biogeographic Region (far northern corner). The South Western Slopes botanical region is an intensively and extensively disturbed area of NSW. Given a combination of mainly flat to undulating country, fertile soils and reliable rainfall, European settlement proceeding rapidly between 1829 and 1845. This led to large scale modification of the landscape for cropping and grazing of domestic stock over the next 100 years (Burrows 1999).

The Bodangora study area is largely cleared and used for cropping, such as wheat, and stock grazing, primarily sheep. Remnant trees and stands of woodland characterise much of the area. The proposed activity areas are located in paddocks that have been almost entirely cleared of their original natural vegetation and habitats. Most of the land is ploughed, cropped paddocks or exotic grassland. Three vegetation categories have been identified in the proposal area. These include remnant woodland, widely-spaced trees, and predominantly treeless paddocks (Kevin Mills & Associates 2011).

Almost all of the remnant trees, patches of trees and occasional patches of native grassland in the lower areas are part of the one plant community, the White Box - Yellow Box - Blakely's Red Gum Woodland (Kevin Mills & Associates 2011). The granite country in the central and southern parts of the project area supports woodland with a high proportion of White Cypress Pine *Callitris glaucophylla*. The associated trees, depending upon topography, are White Box *Eucalyptus albens*, Blakely's Red Gum *Eucalyptus blakelyi*, Red Stringybark *Eucalyptus macrorhyncha*, Red Box *Eucalyptus polyanthemos*, Kurrajong *Brachychiton populneus* and Hickory Wattle *Acacia implexa (*Kevin Mills & Associates 2011).

A White Box Woodland community occurs on most low-lying sites and extends onto the ridges in most places except the poorest soils. The main tree is White Box, and it occurs with Blakely's Red Gum, Yellow Box *Eucalyptus melliodora* and, to a lesser extent, Kurrajong. Fuzzy Box *Eucalyptus conica* occurs as individual trees on the lowest flats. On the ridges, White Box is also dominant, in addition to Blakely's Red Gum, Mugga Ironbark *Eucalyptus sideroxylon* and Kurrajong. There is almost no native grassland understorey remaining. At most, tussocky native pasture is found in a few paddocks, sometimes dominated by species of

Spear-grass *Austrostipa* spp. and/or Redleg Grass *Bothriochloa macra (*Kevin Mills & Associates 2011).

Plate 3 Granite pavement on *Panorama*.

The poor, stony soils on the sedimentary rocks support woodland to forest containing the species Red Stringybark *Eucalyptus macrorhyncha*, Tumbledown Gum *Eucalyptus dealbata*, Long-leaved Box *Eucalyptus nortonii* and Red Box *Eucalyptus polyanthemos*. This is the woodland north of Mount Bodangora. Typical understorey species include Silvertop Wallaby Grass *Joycea pallida*, Grey Guinea Flower *Hibbertia obtusifolia*, Nodding Blue Lily *Stypandra glauca* and Urn Heath *Melichrus urceolatus*.

Summary

In an Aboriginal land use context, the study area is likely to have been marginal woodland country. Water courses are ephemeral and swamps are absent. In short, biodiversity values of the area would have been relatively low and, accordingly, it is likely to have been utilised for a limited range of activities. These may have included hunting and gathering and travel through country. Such activities are likely to have resulted in low levels of artefact discard. The nature of stone artefacts discarded can be expected to have been correspondingly limited in terms of artefact diversity and complexity.

5. ABORIGINAL HERITAGE CONTEXT

Aboriginal people have occupied Australia for at least 40,000 years and possibly as long as 60,000 years (Mulvaney and Kamminga 1999: 2). By 35,000 years before present (BP) all major environmental zones in Australia, including periglacial environments of Tasmania, were occupied (Mulvaney and Kamminga 1999: 114).

At the time of early occupation, Australia experienced moderate temperatures. However, between 25,000 and 12,000 years BP (a period called the Last Glacial Maximum), dry and either intensely hot or cold temperatures prevailed over the continent (Mulvaney and Kamminga 1999: 114). At this time, the mean monthly temperatures on land were 6 - 10ºC lower; in southern Australia coldness, drought and winds acted to change the vegetation structure from forests to grass and shrublands (Mulvaney and Kamminga 1999: 115-116).

During the Last Glacial Maximum at about 24 - 22,000 years ago, sea levels fell to about 130 m below present levels and, accordingly, the continent was correspondingly larger. With the cessation of glacial conditions, temperatures rose with a concomitant rise in sea levels. By c. 6000 BP sea levels had more or less stabilised to their current position. With the changes in climate during the Holocene, Aboriginal occupants had to deal not only with reduced landmass, but changing hydrological systems and vegetation; forests again inhabited the grass and shrublands of the Late Glacial Maximum. As Mulvaney and Kamminga (1999: 120) have remarked:

> *When humans arrived on Sahul's shores and dispersed across the continent, they faced a continual series of environmental challenges that persisted throughout the Pleistocene. The adaptability and endurance in colonising Sahul is one of humankinds' inspiring epics.*

5.1 Wiradjuri Country

The study area is situated within land, which today, is seen as having traditionally been occupied by the Wiradjuri peoples. This attribution of group relationship was made by Tindale (1974) based on notions of affiliation due to a shared language throughout a broadly distributed Aboriginal population. The Wiradjuri inhabited a widespread area which extended from the Great Dividing Range, west to the Macquarie, Lachlan and the Murrumbidgee rivers (Coe 1989). In so doing, their country encompassed three distinct geosystems: the tablelands in the east, the central western slopes, and to the west, the southwest plains.

Aboriginal occupation in the Darling Basin, which encompasses part of the Wiradjuri territory to the west, has been dated to 40,000 years (Haglund 1985). Closer to the study area, archaeological excavations in the western Blue Mountains have shown Aboriginal occupation to 12,000 years BP (Lourandos 1997), with the earliest dated occupation in the immediate region being just over 7,000 years BP at Granites 2 shelter, about 50 km north-east of Manildra (Pearson 1981). A similar date was derived from the dating of the skeletal remains of a male individual found in a cave near Cowra (Pardoe and Webb 1986).

The major rivers and associated tributaries were the focus of livelihood and supplied a variety of consistent and plentiful food including fish, water fowl and shellfish. On August 22, 1817, John Oxley, the first European to travel up the Macquarie River from the Wellington Valley, observed 'an abundance of fish and emus … swans and ducks' as well as very large mussels growing among the reeds in many stretches of the river (Oxley 1820).

Riverine resources were supplemented with kangaroos and emus. According to Thomas Mitchell, Surveyor-General of the Colony of NSW, possums formed a significant part of people's diet, as

well as being used for making warm winter cloaks, arm bands and other items of clothing. Mitchell, who conducted several expeditions into the area in the 1830s and1840s, wrote that possums were found in the hollow trunks of upper branches of tall trees which were climbed by cutting notches into the trunks.

Vegetable foods formed a significant part of the diet. The Wiradjuri exploited daisy yams (Microseis scapigera) and a range of other roots and tubers, including lily and orchid tubers and Kurrajong roots (*Brachychiton populneum*) (Gott 1983, White 1986: 57-58). Kurrajong and Acacia seeds would be ground for flour, as would certain grass seeds, such as oat grass or kangaroo grass (*Themeda australis*).

Numerous studies have been undertaken, both in an academic and consultancy context, in the broader region of the Western Slopes and adjoining plains region of NSW. Consideration of a predictive model of site type and site location within a geographical context relevant to the study area can be made through recourse to these previous studies. From this a contextual and relevant assessment of the archaeological potential of the study area can be formed.

Pearson (1981) conducted a comprehensive study of the upper Macquarie region in relation to his PhD dissertation. In addition to carrying out extensive research of historical sources and reviewing ethnographic data, Pearson (1981) excavated three rock shelters and compiled information about other known archaeological sites in his study area. He determined that the Wiradjuri functioned primarily in small groups of variable size, dependent on the season. These groups were comprised of immediate relations, the smallest being the basic family unit, but groupings could coalesce to form a collective band of between 80-150 people during feasting in times of plentiful food, or for ceremony.

Between them, in smaller groups of up to 20 people, they exploited the resources of a common territory which had a radius of up to 65 km, but which was generally centred on a particular home base location that possessed a reliable watercourse (Pearson 1981). Pearson (1981) suggests that there may have been three distinct band territories in the local region, centred on Bathurst, Wellington and Mudgee/Rylstone. From this it may be deduced that the proposal area is likely to have been one locale within the range of a single Wiradjuri band. However, given the generally ephemeral nature of the local catchments and creek lines, the locus of that bands' place of habitation would be closer to a more permanent source of water such as, for example, the Macquarie River.

Pearson (1981) developed a pattern of Aboriginal occupation through the analysis of site location attributes in relation to just over 40 recorded open campsites within four sample areas in the region. He found that archaeological sites could be grouped into two main types, occupation sites, and non-occupation sites, the latter including scarred or carved trees, ceremonial sites, grinding grooves and burial sites. Through analysis of the location of these sites he proposed the following model for the prediction of site location (Pearson 1981):

- The distance of sites from water ranged from 10 to 500 m. However larger sites were generally located nearer to water (Pearson's average distance from water being 90 m);
- Both good soil drainage and views over watercourses were important site location factors;
- Level ground, shelter from prevailing winds, and elevation above cold air (Pearson's average elevation being 9.1 m) also influenced site location;
- The majority of sites were situated in places that would originally have been comprised of open woodlands in order to source adequate fuel;
- Burial sites and grinding grooves were located as close to habitation as possible. However, grinding grooves occur only where there is suitable outcropping sandstone,

and burial sites are generally found in areas where soils are of sufficient depth and penetrability for the purposes of interment;

- Ceremonial sites such as earth rings were situated away from campsites;
- Similarly, stone arrangements were also located away from campsites, in isolated places, and were more likely to be located on small hills or knolls, although they can also occur on flat land;
- Scarred or carved trees were distributed with no obvious patterning other than their proximity to watercourses, and in areas more frequently used for camps;
- Quarry sites were located where known outcrops of serviceable stone were reasonably accessible;
- Pearson suggests that Aboriginal campsites were rarely used for longer than three nights, and that sites with evidence of extensive archaeological deposit probably represent accumulations of material over a series of short visits.

Koettig (1985) undertook a comprehensive study relating to Aboriginal occupation of the Dubbo area. Following a desktop review, Koettig (1985) commenced a systematic survey of a variety of landform units and stream orders so as to ascertain the relationship of site type and site location to specific environmental settings within three principal physiographic zones.

As a result of this study Koettig (1985) proposed that:

- Aboriginal sites will be distributed throughout all landscape units;
- Open artefact scatters, scarred or carved trees and grinding grooves are the most common site types;
- The location and comparative size of sites is principally determined by environmental and social influences. While site location dictated by social determinants cannot be predicted, some modelling of site type and site location in relation to environmental factors may be made. Those factors include:

  Proximity to water:- although sites were found in all landscape settings including hills and ridges distant from water, the largest campsites were located close to permanent watercourses.

  Availability of food resources:- While the widest range of foods was found along major watercourses in association with the available permanent water, some foods were seasonal and located away from permanent watercourses.

  Geological formation:- Certain site types occur in particular settings. Grinding grooves are located where there are suitable sandstone outcrops, while quarries are found where there is a useable and accessible stone resource. Burials are most likely to be found in sandy deposits such as those that exist on alluvial flats.

5.2 Material Evidence

A search of the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Management Information System has been conducted for this project on the 15th September 2010 (AHIMS #31940). The search area measured 380 km^2 and encompassed eastings 685000 – 704000, and northings 6400000 – 6420000.

Ten previously recorded Aboriginal objects are listed on the AHIMS register for the site search area, all of which are located outside the proposal area (Table 1; Figures 4 and 5).

The AHIMS register only includes sites which have been reported to the NSW OEH. Accordingly, this search cannot be considered to be an actual or exhaustive inventory of

Aboriginal sites situated within the local area. Generally, sites are only recorded during targeted surveys undertaken in either development or research contexts. It can be expected that additional sites will be present within the local area, but that to date, they have not been recorded and/or reported to NSW OEH.

The most common Aboriginal object recordings in the region are distributions of stone artefacts. Rare site types include rock shelters, scarred trees, quarry and procurement sites, burials, stone arrangements, carved trees and traditional story or other ceremonial places. The distribution of each site type is related at least in part to variance in topography and ground surface geology.

Table 1 AHIMS site search.

Site ID	Name	AGD Easting	AGD Northing	GDA Easting	GDA Northing	Type
36-1-0159	B1 Bodangora Aerodrome	686900	6406550	687013	6406734	Scarred tree
36-1-0160	B2 Bodangora Aerodrome	687000	6406500	687113	6406684	Scarred tree
36-1-0161	B3 Bodangora Aerodrome	686650	6406800	686763	6406984	Scarred tree
36-1-0162	B4 Bodangora Aerodrome	686700	6406400	686813	6406584	Scarred tree
36-1-0255	Comrobulla	685050	6418300	685163	6418484	Open camp site
36-1-0257	Mitchells Creek Reserve	685000	6418120	685113	6418304	Scarred tree
36-2-0001	Mt Bodangora	697863	6410220	697976	6410404	Open camp site
36-2-0034	Mitchell Creek	689600	6407290	689713	6407474	Scarred tree
36-2-0035	Mitchell Creek	689540	6407380	689653	6407564	Scarred tree
36-4-0099	Isolated artefact CC-IF-01	686314	6401244	686427	6401428	Artefact

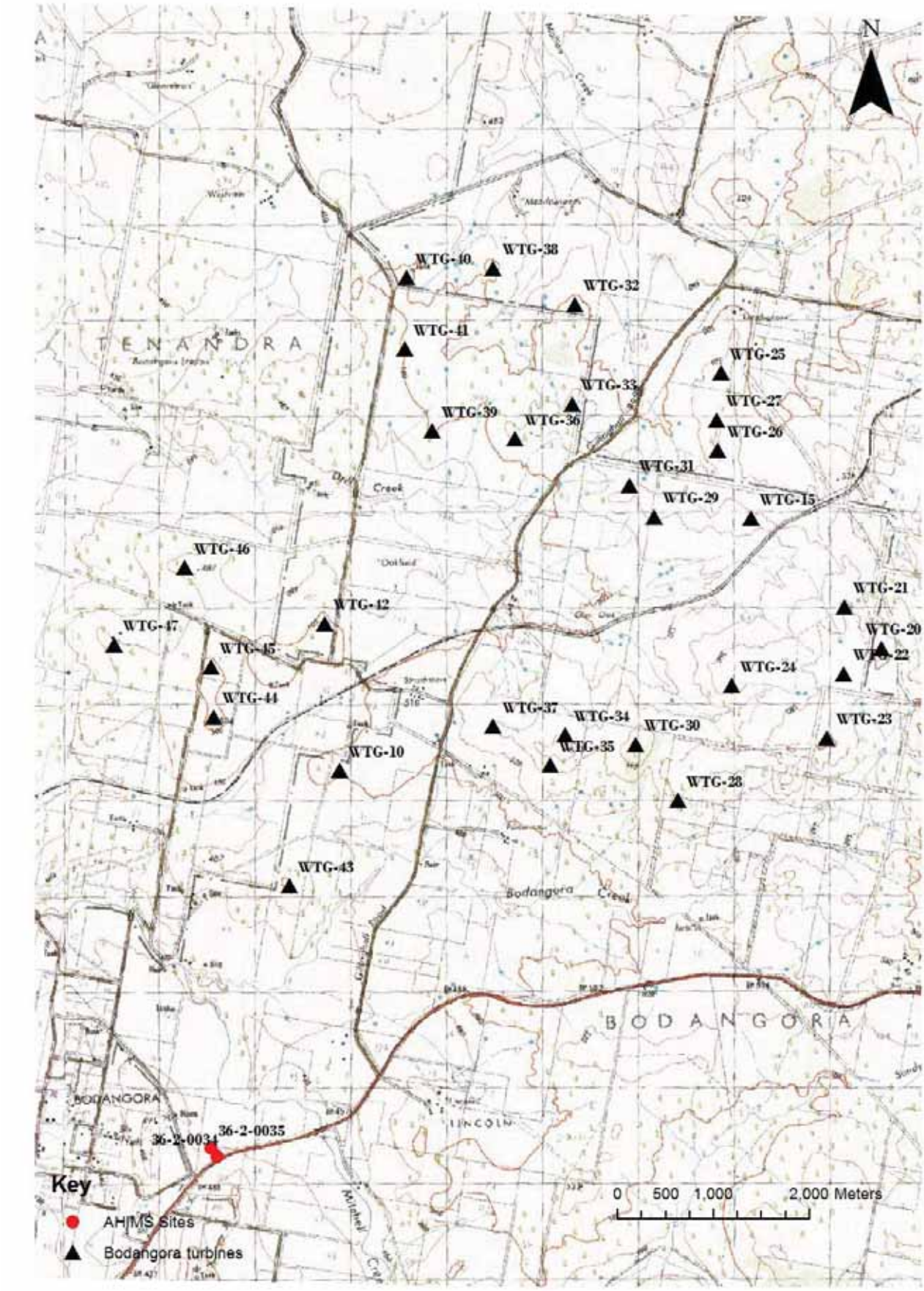

Figure 4 Location of AHIMS sites: western area.

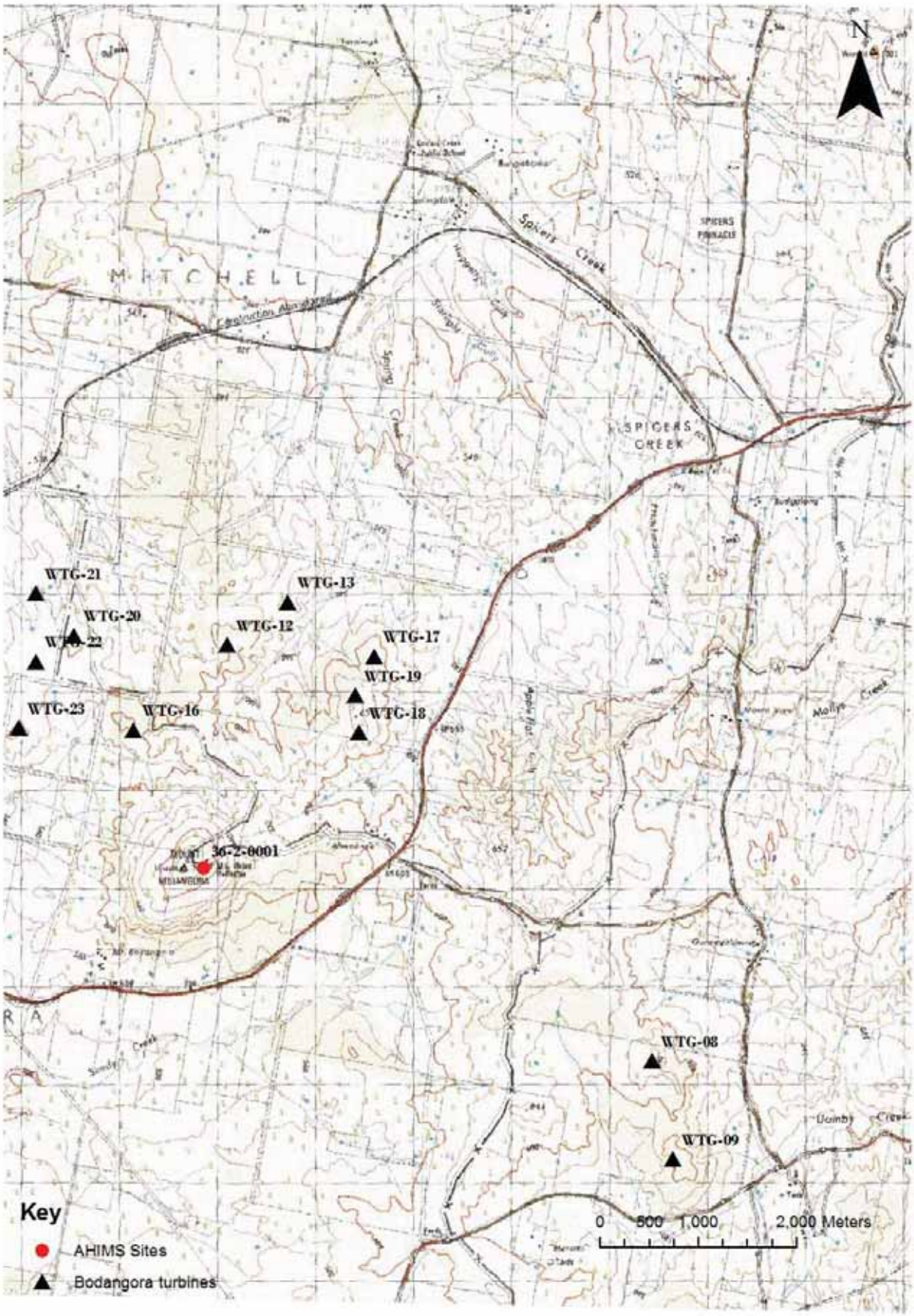

Figure 5 Location of AHIMS Sites: eastern area.

5.3 Previous Archaeological Work

A limited number of archaeological studies have been undertaken in the Wellington area. Accordingly, the following review will consider work conducted within the wider region.

Cubis (1982) conducted a survey and assessment of a proposed 330kV electricity transmission line between Wallerawang and Wellington. The proposal route measured c. 140 kilometres. Cubis recorded 55 Aboriginals sites, most of which were stone artefact scatters. In addition he recorded stone quarries, which were later assessed to be erroneous recordings (cf. Bowdler 1982).

McIntyre (1985) surveyed two proposed electricity lines between Wellington and Dubbo, a distance of 54 kilometres. Fifteen sites and 12 isolated finds were recorded, all of which were assessed to be highly disturbed. Site location were frequently found to be adjacent to water courses, either seasonal creeks or the Macquarie River. Two scarred trees and two canoe trees were identified.

Lance (1985) undertook a survey in relation to a proposed transmission line that extended 145 kilometres from Wellington to Forbes. Two scarred trees, 14 isolated finds and 16 open camp sites were recorded. While over half the sites (58%) were comprised of 10 artefacts or less, 12% of the sites were made up of scatters of over 100 stone artefacts.

Dallas and Smith (1989) conducted an archaeological survey of the Commonwealth Gold Mine site which was proposed for re-opening. The site is 20 kilometres upstream from Wellington on the Macquarie River. Two artefact scatters were recorded, one of which, located at the confluence of the Macquarie River and Deep Creek, was found to be extensive.

Davies (1993) surveyed a 192 kilometre long Telecom optic fibre cable route that extended from Orange to Narromine. During the survey five artefact scatters, one artefact scatter associated with a scarred tree, one scarred tree and three isolated finds were recorded.

Barber (1996) conducted an assessment of a hilltop located 1 kilometre south-east of Wellington. The site was heavily disturbed and no recordings were made.

Kelton (1998) conducted an archaeological assessment in relation to the proposed upgrade of Main Road 61, between Parkes and Manildra. During the field survey two Aboriginal sites were recorded near the Bindogandri Creek Bridge. A scarred tree (white box - *E. albens*) with steel axe marks indicating the possibility that was not of Aboriginal origin was recorded, as well as an open camp site comprised of a low-density artefact scatter. The artefacts were made of chert and fine-grained metamorphosed siltstone.

Kelton (1999) surveyed an area located four kilometres south-west of Wellington proposed for the Sewerage Treatment plant expansion. No sites were recorded.

Navin Officer (2001a; 2001b; 2002; 2003) undertook several studies between 2001 and 2003 in relation to the proposed Molong to Manildra 132kV electricity transmission line. The initial study surveyed various corridor options for the transmission line and recorded recording four Aboriginal sites immediately to the east of Manildra, comprised of three open artefact scatters and one isolated find.

Navin Officer thereafter conducted further survey in relation to the transmission line corridor, Stage 1 extending south and east of Molong (Navin Officer 2002), and Stage 2 ran from Manildra to Molong (Navin Officer 2003). During the Stage 2 survey thirteen Aboriginal sites were recorded including one area of Potential Archaeological Deposit (PAD), seven artefact scatters - three with predicted areas of PAD, and six isolated finds-one with associated PAD.

OzArk (2003) undertook a survey in relation to a proposed pipeline route extending from Gray's Hill Reservoir at Cudal, to Manildra Reservoir. Over a c. 8.25 km route, one widespread open camp site was recorded immediately adjacent to Mandagery Creek. In conditions affording good ground surface visibility, this site extended 200 – 300 m in length along the line of the creek and extended back 30-50 m in width. Of the artefact scatter, 19 stone artefacts were recorded, made from a variety of raw materials including chert, quartz and at two types of fine-grained volcanic stone.

OzArk Environmental and Heritage Management (2007) conducted an assessment of a proposed Radio Tower at Mt Wellesley, seven kilometres south-east of Wellington. No sites were found.

Australian Museum Business Services (2008) conducted a survey and assessment of a Gas Pipeline extending between Alectown and Wellington (100 kms), and a gas fired power station site at Wellington. Despite the huge survey area, four sites only were recorded. The sites included three artefact scatters and one scarred tree, and all were found to be tethered to creek lines.

OzArk (2009) surveyed a 132kV electricity transmission line route from Manildra to Parkes. Eighteen Aboriginal sites were recorded along the route, comprised of two scarred trees, two isolated finds and fourteen open sites in association with Potential Archaeological Deposit. Open site PM-OS4, located c. six kilometres southwest of Manildra, is comprised of over 100 artefacts situated adjacent to a confluence of Mackeys Creek and an unnamed tributary. With a maximum artefact density of 3/m^2 and an average density of 0.5/m^2, the site extended 150 x 150 m, with artefact density decreasing with distance from the creekline and an increase in gradient. Artefactual raw material included chert, greywacke, quartz, quartzite, silcrete and fine grained siliceous. OzArk's (2009) overall survey results were found to conform to a predictive model that proposes that sites are likely to be to be located in close association with watercourses. All sites that were recorded in this survey were situated close to watercourses, a few of which were ephemeral in nature.

5.4 Predictive Model of Site Type and Location

Stone artefact scatter sites, scarred or carved trees and grinding grooves are the most common site type found within the region. Koettig (1985) found that larger and more complex sites are likely to occur in association with permanent watercourses, while sparse artefact scatters and evidence of intermittent and infrequent occupation will be located on landforms which are removed from permanent water sources, such as ridge tops or lower order ephemeral creeks. While this assertion was based on limited survey and analysis, it is possible that it is, nevertheless, generally correct.

The type of sites known to occur in the region and the potential for their presence within the study area are listed as follows:

Stone Artefacts

Stone artefacts are found either on the ground surface and/or in subsurface contexts. Stone artefacts will be widely distributed across the landscape in a virtual continuum, with significant variations in density in relation to different environmental factors. Artefact density and site complexity is expected to be greater near reliable water and the confluence of a number of different resource zones. The detection of artefacts during a surface survey depends on whether or not the potential archaeological bearing soil profile is visible.

Given the environmental context of the proposed wind farm, stone artefacts are predicted to be present in very low to low densities across the study area.

Grinding Grooves

Grinding grooves are found in rock surfaces and result from the manufacture and maintenance of ground edge tools. Grinding grooves are only found on sedimentary rocks such as sandstone. Given the absence of suitable rock exposures in the study area grinding groove sites are unlikely to be present.

Burials sites

The potential for burials to be present in the proposal area is considered to be low given the high levels of previous disturbance related to agriculture.

Rock Shelter Sites

Rock shelters sites are unlikely to be present in the study area given the absence of large vertical stone outcrops.

Scarred and Carved Trees

Scarred and carved trees result from either domestic or ceremonial bark removal. Carved trees associated with burial grounds and other ceremonial places have been recorded in the wider region. In an Aboriginal land use context this site type would most likely have been situated on flat or low gradient landform units in areas suitable for either habitation and/or ceremonial purposes.

Bark removal by European people through the entire historic period and by natural processes such as fire blistering and branch fall make the identification of scarring from a causal point of view very difficult. Accordingly, given the propensity for trees to bear scarring from natural causes their positive identification is impossible unless culturally specific variables such as stone hatchet cut marks or incised designs are evident and rigorous criteria in regard to tree species/age/size and it specific characteristics in regard to regrowth is adopted.

The likelihood of trees bearing cultural scarring remaining extant and in situ is low given events such as land clearance and bushfires. Generally scarred trees will only survive if they have been carefully protected (such as the trees associated with Yuranigh's grave at Molong where successive generations of European landholders have actively cared for them).

Nevertheless scarred trees are a relatively common site type in the region. There is, accordingly, potential for this site type to be present if trees of adequate age are present.

Stone Quarry and Procurement Sites

A lithic quarry is the location of an exploited stone source (Hiscock & Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occur. Quarries are rare site types in the region. Within the study area itself the underlying geology is shale, basalt or granite, none of which is suited to the manufacture of artefacts. However, quartz seams in both the shale and granite may well have been exploited locally.

Ceremonial Grounds

In south-eastern Australia ceremonial grounds were used in maturity rites associated with the initiation of youths. Bora grounds generally consisted of one or more circular rings defined by mounded earth, sand and/or rocks. This is a rare site type given the nature of the materials used in there construction; agricultural practices and land clearing is likely to remove surface evidence

of these places. The identification of ceremonial grounds is often dependent on Aboriginal oral tradition and historical records. This site type is unlikely to be present in the proposal area.

6. HERITAGE CONTEXT – NON-ABORIGINAL

6.1 Alienation of Lands Within the Colony of New South Wales

When New South Wales was settled as a British Colony in 1788 all lands became the property of the Crown. A major component of the colonial process was the creation and maintenance of spatial order (Jeans 1966: 205). The alienation of land was controlled at the discretion of the colonial government, initially under direction of the Colonial Office in London. Grants, in the first instance, were offered to officers and civil servants as both reward and incentive to relocate. This was later extended after Governor Phillip was instructed to grant land for farming to discharged soldiers, free settlers and convicts who had served their term (Shaw 1970: 11).

As the population and demand for land increased, measures were adopted by both the government and settlers to enable the spread of settlement and an increase in agricultural production. With a further increase in the population of settlers and livestock numbers after 1800, the demand for land continued to grow.

In 1822, J. T. Bigge filed his Report to the Commissioner of Inquiry into the State of the Colony of New South Wales. Bigge had been dispatched to the Colony in 1819 by the British government to determine, among other things, if the Colony was achieving its aims as a penal settlement and to consider its development and commercial viability. Bigge recommended an increase in land grants, but stipulated that such grants should only be made to those who could contribute to an increase in pastoral production (Molony 1988: 45). Assigned convict labour was intended to assist with the maintenance of pastoral properties granted under such a system.

Governor Macquarie continued to grant land to cater for the needs of increasing livestock numbers. Although alienation was not permitted without survey, nevertheless, by 1821, about 340,000 acres of land grants could not be located as their issue had outpaced the ability of surveyors to accurately determine their placement (Perry 1965: 44). The three-man survey department was not able to cope with the demands made on it, and the number of uncompleted surveys of lands located beyond the immediate vicinity of Sydney began to mount. The ability to meet the demand for land became even more difficult, when in 1826, the administration of Sir Ralph Darling temporarily restricted land grants to the initial nineteen counties that had been created around Sydney. This area became known as the 'Limits of Location', and extended from Kempsey in the north, to Batemans Bay in the south, while its western boundary terminated at Wellington (Ellis 1997: 27, Gibbney 1989: 17-19).

In order to allow occupation of new lands, satisfy demand and maintain some control on the spread of settlement, in 1827, the government introduced 'tickets of occupation' to allow graziers rights over the lands they occupied (Carter 1994: 9-10). These were replaced in 1828 by grazing licenses. From that time, through a variety of means, there was a spread of both official and unofficial settlement, and Crown Lands began to be broken up into smaller portions.

Grants and sales, either directly or at auction, permitted the alienation of land. However, demand outstripped supply. 'Squatters' began to occupy large tracts of land outside the settled districts beyond the control of the colonial government (Cannon 1988: 9; Carter 1994: 10-12). In order to wrest back control, various regulations were introduced to allow land to be leased or licensed for a fee to depasture stock. Sales as a result of improvements to land occurred later, along with sales at auction for a set minimum price per acre. However, for many prospective landowners insufficient capital restricted their access to available lands, so that the majority of fertile lands remained in the hands of a wealthy few.

By 1850, settlement had spread throughout New South Wales and Victoria (Shaw 1970: 45), and at that time, 3,000 squatters had the use of over 70 million acres of Crown Land (Jeans 1966:

212). It was during this period that political support increased for small rural landholders. Support came from a number of groups, including:

- land owners seeking to restrict the squatters and capitalise on their own investments;
- tenant farmers seeking access to rural land;
- successful gold-miners with capital to invest in land;
- independent shopkeepers who resented the squatters use of Sydney wholesalers; and
- agitated politicians fearful of the growing power of the 'squattocracy'.

In 1861, Sir John Robertson, the Minister of Lands, introduced legislation (Crown Lands Occupation Act 1861 and Crown Lands Alienation Act 1861) to allow selection of land by any person under certain conditions, at a set price of one pound per acre. One quarter of the purchase price was required with the balance deferred as long as certain conditions were met. This legislation set minimum and maximum sizes for portions as well as orientation and boundary proportions. Selection could also take place prior to survey. The intention of this legislation was to allow access to land on fair and easy terms and promote closer settlement throughout the colony. Despite these intentions, the legislation failed in that loopholes and indiscriminate practices allowed the original landholders to maintain control of much of their original 'runs' (Carter 1994: 21). By 1874 '... deserted farms are everywhere visible to the traveller ...' (Jeans 1972: 213). Nevertheless, the policy of closer settlement continued and by the 1890s large land holdings had gradually given way to a myriad of smaller farms. As a result of World War I, the first half of the twentieth century saw Soldier Settlement land programs in place throughout Australia.

The modern landscape not only reflects a sequence of occupation and activity through a number of phases of ownership, improved technology and changing farm management practices, but evidence of the legislative and administrative controls governing alienation and land use.

6.2 Regional History

Exploration and Pioneers

By 1813 the colony's livestock herd, pastured on overstocked plains surrounding Sydney, had increased to some 26,000 head of cattle and 74,000 sheep. With drought and plagues of caterpillars further reducing feed, stock owners grew anxious to secure more grazing land and attention was drawn to what may lie inland of the Great Dividing Range. Following an expedition in 1813 by Lawson, Wentworth and Blaxland, who sighted good grazing grounds west of the range, Governor Macquarie instructed surveyor Evans to follow Lawson's marked route and explore further inland. In so doing, Evans became the first European to reach the western side of the Great Dividing Range, surveying to the Macquarie River and beyond the area of present-day Bathurst (McDonald 1968: 1-3).

Further encouraged by Evan's report of excellent grazing land to the west, Macquarie commissioned William Cox and a team of convicts to construct a road across the range. Remarkably, despite numerous areas of precipitous terrain, this task was achieved in less than six months. Thereafter, settlers began populating the area, bringing their livestock to graze on the open western plains. In 1816 Macquarie visited the newly opened district, at which time he selected the site for the township that became known as Bathurst (McDonald 1968: 3).

The following year Macquarie instructed Lieutenant John Oxley R.N, the Surveyor-General of New South Wales, to explore further to the west beyond Bathurst, in order to ascertain the course and nature of the river system which Evans had described (McDonald 1968: 3). Oxley was joined on this expedition by Surveyor Evans, as well as Botanist, Allan Cunningham and Mineralogist, William Parr. Although the party had intended to chart the course of the Lachlan River, difficult swampy conditions were encountered, so that eventually Oxley decided the party

should return to Bathurst, but along the Macquarie River (Althofer 1985: 9). As they made their way, the presence of recent cattle tracks was noted (Jervis 1953: 3).

Oxley and his party entered the Wellington Valley on 19 August 1817, after crossing the Cundumbal Range, west of Wellington. He was most taken by what he saw, and recorded in his field book: "Imagination cannot fancy anything more beautifully picturesque than the scene which burst upon us" (McDonald 1968: 4). The following year, Oxley was directed by Governor Macquarie to further explore the course of the Macquarie River. The expedition was planned to set out from the Wellington Valley, where a depot had been prepared. The party travelled down the Macquarie River and came upon rolling and open plains, with some wooded areas and plentiful expanses of grassland.

Pastoralists arrived in the Wellington Valley as early as 1819, and in 1823, a remote convict stock station was established, when under the directive of Governor Sir Thomas Brisbane, Lieutenant Percy Simpson was commissioned to establish a camp with convicts and soldiers in the district. Simpson oversaw the construction of a stockade, situated about three kilometres south of the present township of Wellington, on the high ground above the Bell River. It included a convict-built military barracks, a log and weatherboard jail, a commandant's residence, a brick office and stockyards for their sheep and cattle. In the first year, 280 acres of wheat were sown, but drought and hot winds destroyed much of the crop. The stockade was short lived, and in 1831 the convicts were removed. The settlement buildings were then turned over to the Missionary Society Mission run for the Wiradjuri (Porter 1906: 1-3; Jervis 1953: 4-30).

Towns and Settlements

Before Wellington was established, a private township called Montefiores was founded in 1840 on the northern bank of the Macquarie River by prominent local landowner J. B. Montefiore, subdivided from his property Nanima. However, as time went by, the Montefiores settlement was unable to supply such services as housing and hospital facilities, so that eventually the Government was obliged to meet public demand, and in 1846 approval was granted for the establishment of a new township on land closer to that first occupied by the convict stock station, and the subsequent Wiradjuri mission. The township of Wellington developed and was gazetted in 1846. By 1858 Montefiores had been partially demolished with some houses relocated to the new township (McDonald 1968:39-56).

Nearer to the study area, the settlement known as Lincoln was established in the 1860s near to the Mudgee Road crossing of Mitchell's Creek. A combined general store, post office and inn was established at Lincoln to provide a service, not only for the travellers on this road, but also local farmers. Lincoln also functioned as a Cobb and Co changing station on the route between Gulgong and Wellington (*Sydney Morning Herald* 2nd November 1885: 4). The hotel operated up until 1914, when its licence was been cancelled (The Bodangora Website 2008).

Other settlements in the immediate district sprang up in association with discoveries of gold. The small village associated with the Jawbone alluvial mine was also located on the main road, though a little closer to Wellington than Lincoln. Its public house was called the Waterloo Hotel, and the settlement catered for both travellers and locals. The initial working for gold at Jawbone petered out in the early 1870s and the township dwindled from this time, although there was a second rally between 1899 to 1911 (The Bodangora Website 2008).

A small township associated with the Kaiser mine was established on the banks of Mitchell's Creek, adjacent to where a crushing plant was installed to process the mine's ore. The small village had several residences, a public house, a school, a church and a convent. For a time the Kaiser settlement became a supply centre for not only the mine workers, but also the swelling number of farmers who were taking up land in the district. Although the Kaiser mine ceased

production in 1881, the convent, which had been constructed in 1877, continued to operate (The Bodangora Website 2008).

However, it was Bodangora that became not only the most productive gold mine, but correspondingly, also the most established town in the area. As gold at Jawbone and then Kaiser was exhausted, many miners moved on to work at the nearby Mitchell's Creek gold mine at Bodangora. While in 1890 there were some 40 residents of the town, by 1895 this number had escalated to over 400, and at its peak in 1905 the town hosted more than 900 residents, 228 of whom worked in the mine. At its peak the township hosted a wide variety of businesses, including a bakers, butchers, fruiterers, general stores, footwear suppliers, tailors, drapers, tinsmiths, blacksmiths, billiard saloons, as well as the requisite hotel. The township of Bodangora was gazetted in 1897, but the boom time only lasted until 1908 when mining operations were suspended and the Mitchell's Creek Freehold Gold Estate Mine closed down (The Bodangora Website 2008). From that time the population quickly declined, and despite a few short-term attempts to re-establish the workings, the times of prosperity were never revisited.

Mining

Gold was known to be present in the Mitchell's Creek area north-east of Wellington some time before E.H. Hargraves made his now better known discovery in 1851 at Ophir near Orange (England 1981: 7). A shepherd named McGregor who was employed on the 'Nanima' property, located just to the north of the present day township of Wellington, found pieces of gold along a quartz outcrop near Mitchell's Creek as early as 1839 (Jervis 1953: 63; McDonald 1968: 87; The Bodangora Website 2008). McGregor is said, however, to have been guarded about his find and was able to quietly amass a considerable quantity of gold before word got out and he left the district. The lessor of 'Nanima', Dr Curtis, then reported this gold discovery to Governor Gipps. The news rapidly spread, and a gold rush promptly ensued in the Wellington district, particularly in the area of Bodangora. The 'Bathurst Free Press' reported on 20th April 1856 that hundreds of people had made their way to the district, all eager to obtain 'an auriferous fragment' (McDonald 1968: 88; England 1981: 7).

However, the gold at Mitchell's Creek was mainly located in quartz reefs, which required not only significant effort to extract, but also considerable capital investment. Because of this, the area was initially overlooked as prospectors focussed instead on the more easily accessible alluvial deposits which were being discovered throughout the district. It was not until 1869 that machinery was installed at Mitchell's Creek to crush the quartz and the Sydney based Mitchell's Creek Mining Co. was established. Further gold discoveries were made at Kaiser, some 4.5 kilometres to the north of the Mitchell's Creek find by Mr. Gustave Fitty (or Fitte), and another to the south, being an alluvial deposit which became known as Jawbone (England 1981:7; Cook and Garvey 1999:315; The Bodangora Website 2008).

Of the three mines, Mitchell's Creek proved to be the most viable and saw the establishment of the present day township of Bodangora, formerly called Mitchell's Creek, then Daviesville. However, while both Jawbone and the Kaiser mine failed to live up to their initial promise, each briefly had a township associated with it.

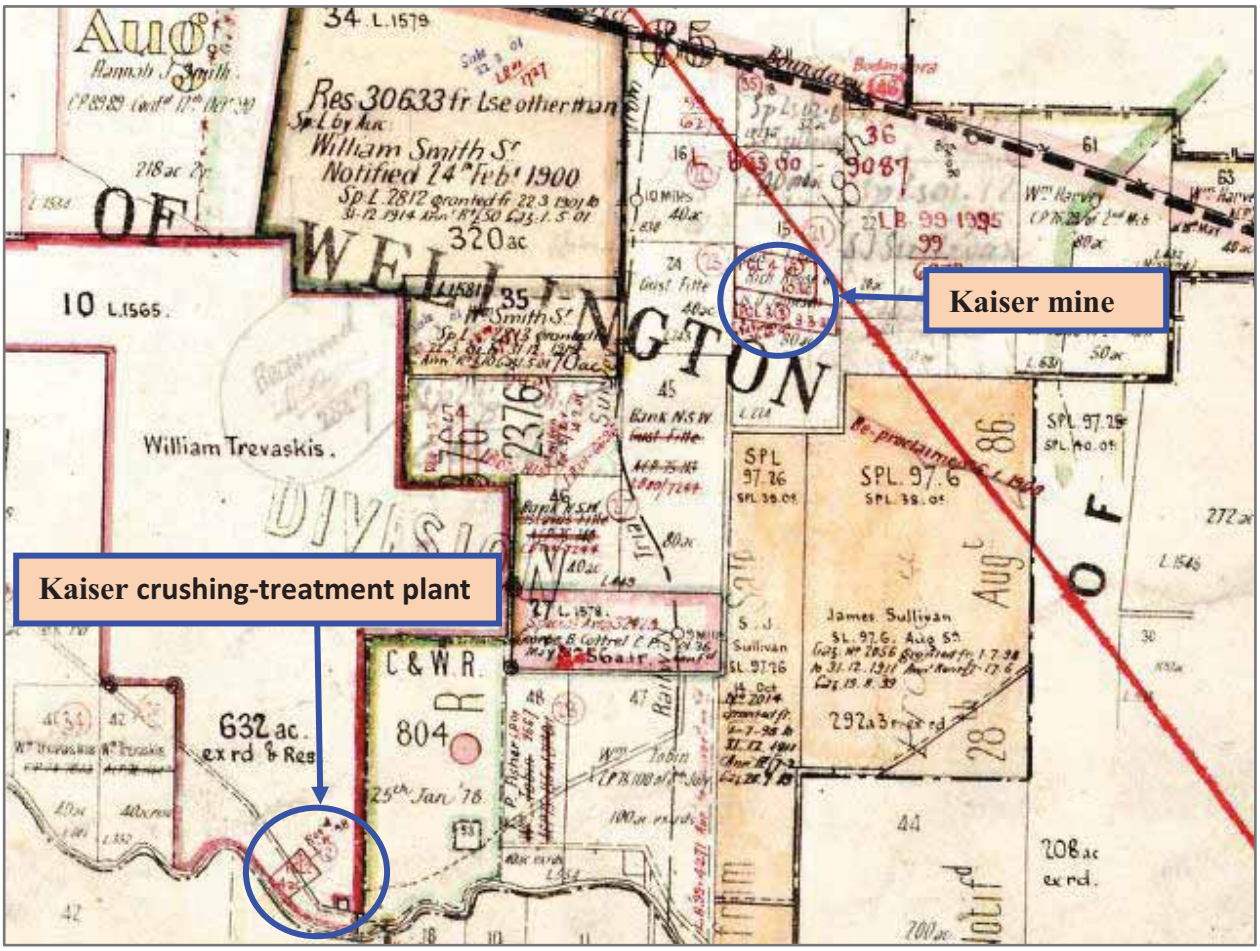

Figure 6 Extract of the Parish of Tenandra, County of Lincoln 3rd edition map, c.1892-1902 (Department of Lands) indicating the location of the Kaiser Mine site and the Kaiser crushing-treatment plant (cf. The Bodangora Website 2008).

The Kaiser mine is located near to the proposed wind turbine generator (WTG) 44 (see Figure 7). It was owned and run by Messrs. Rouse and Jamieson and during its operation it produced copper as well as gold. The earliest records detailing the operation of this mine date from 1876 and indicate a lack of access to water as being a significant impediment with regard to gold extraction. In order to address this shortage, a crushing-treatment plant was established on the banks of Mitchell's Creek with the ore transported to this area from the mine (see Figure 6). The Kaiser mine's 25 HP battery was described in 1878 as 'being one of the most complete crushing plants in the colony'. This area on the northern bank of Mitchell's Creek became known as Kaiser Crossing, and it is here that a small settlement associated with the Kaiser mine sprang up. In addition to numerous residences, this settlement also had a public house, a church, a convent and a school, and for a brief period it became a supply centre, not only for the mine workers, but also the rapidly growing number of settlers who had taken up selections in the surrounding district (England 1981: 7; The Bodangora Website 2008).

The Kaiser mine ceased production in 1881, and although a number of subsequent attempts were made to start the mine up again and extract ore in profitable quantities, the mine was never commercially successful for its succeeding owners because it would seem that there was no consolidated body of ore present. As it eventuated, there was never enough copper deposit to be profitable and most of the gold which did exist, around 1,000oz's in total, had been extracted by 1881 (The Bodangora Website 2008).

Agriculture / Pastoralism

Pastoralism was introduced into the Wellington Valley as early as 1817, the year that Oxley had observed the presence of recent cattle tracks as he was exploring the region. Thereafter pastoralists moved into the district in increasing numbers as they sought ever more pasture for their herds. Also, as noted, in 1823 at the convict built stockade near present day Wellington, Lieutenant Percy Simpson oversaw the planting of the first wheat crop when 280 acres of seed was sown. However, while pastoralism flourished from its introduction, agriculture in earnest was slow to become established, principally because the great distance to the main market in Sydney made such farming unprofitable (Jervis 1953: 4-32).

From 1834, applications were being made to purchase land along the Bell and Macquarie Rivers, and from 1836, numerous pastoralists were applying for grazing licences in the Wellington district. Between 1836 and 1839, considerable lands with river frontage were released and sold at five shillings per acre. As a result of this sudden influx of settlers, by 1838, the district is indicated to have been 'well settled' and advancing in prosperity. By 1844, some 590 free settlers and 138 bonded servants were residing in the area, with more than 80 stations listed within the boundaries of the Wellington Pastoral District. Although sheep farming was the chief undertaking, with a tally of 175,500 in the district in that year, there was also considerable focus of cattle as well, with 53,530 head in total (Anderson 1983 : 2; McDonald 1968: 32).

The Robertson Land Act of 1861 led to numerous free selections being taken up throughout the district, although at this time some prime lands nearer to the study area remained locked up as gold-field reserves. The area which comprises the township of Bodangora and its surrounds was formerly part of the 'Nanima' estate, and was originally used primarily for sheep grazing. With the introduction of the Robertson Act, much of the old estate was freed up for closer settlement, with blocks being put up for ballot. It was through this legislative mechanism, that property holdings were divided up to resemble much of their present day configuration.

With the introduction of the rail system in 1880, farmers gained a greater ability to transport goods, and thus a greater ability to sell wheat to more distant regional centres. As an indication of the corresponding increase this had on local agriculture at this time, in 1881 in the Wellington district, 6,134 acres were sown for wheat. Ten years later, by 1891, land given over to the growing of wheat grain had increased to 11,628 acres, which produced 113,673 bushels of wheat (Jervis 1953: 34).

In 1874, at a meeting held at Wynne's Hotel, the Wellington Pastoral and Agricultural Society was formed. The Society held its first district exhibition the following year, and thereafter sporadically up until 1893, after which the exhibition became an annual event. The exhibition was staged to acknowledge and promote the best standards of livestock and produce developed in the district, and to honour these (Porter 1906: 27-29). Continuing through to today, agriculture and pastoralism have remained central to many who reside in the district.

Transport

The development of the New South Wales railway system was seen as an event of national importance, linking the state's interior to Sydney, and providing a swift and reliable means of transporting people and goods to great commercial advantage. Since its formation in 1861, the town of Bourke had become a key centre for pastoralists in western New South Wales, and it was from here that trade was communicated to Victoria and South Australia via the Darling and Murray Rivers. There was significant political pressure to capture this trade for the benefit of New South Wales, and this was a key factor in driving the construction of the Main Western railway line beyond Bathurst and Orange. Thus provision was made to extend the line to Dubbo and beyond, reaching Wellington in 1880 and Dubbo in 1881, and finally Bourke in 1885 (McDonald 1968: 56-64).

Although being serviced by rail no doubt assisted Wellington with regard to commerce and communication, it nevertheless gained a reputation as being 'the slowest town in the Western District' (McDonald 1968: 64). Throughout the war years, few advancements were made in the Wellington district as all energies were expended supporting the war effort. However, in 1927 the urban centre of the Wellington township was illuminated for the first time with electrical lighting. The Wellington Times reported that the town was '….a blaze of light'. Yet, despite the apparent success of this new innovation, many people raised their voice in strong condemnation with regard to the emplacement of 'disgraceful looking poles of undressed timber' throughout the town (McDonald 1968: 64).

As early as the 1880s, proposals were being advanced advocating the construction of an additional railway line that would link the Main Western line to the Northern line. The motivations for such a development were numerous and shifted over time. However, they essentially centred on the speeding up of communications between the western and northern districts, which was seen to be advantageous for a variety of reasons including decentralisation and the movement of stock and goods. In addition, during the depression, such a public works project would be able to provide jobs for a large number of the unemployed (McDonald 1968: 182-189).

The line has a chequered history, and although enquiries were held into the feasibility of its construction from as early as 1911, it shifted in and out of public and political favour as various interested parties argued preferred routes in relation to perceived benefits, while at the same time successive governments were daunted by the escalating estimated costs of construction. It was not until 1936 that work finally began on the Maryvale to Sandy Hollow line (Maryvale being located ca. 9 km north of Wellington). During the Second World War work on the line came to a halt, but recommenced in the early post war years before being completely abandoned in 1951 due to a shortage of funds. By this stage 95 percent of the construction had been completed, the earthworks were almost completed, although no track had been laid (Bureau of Transport Economics 1979:5). Subsequent attempts to complete the railway have failed in the face of unfavourable economic assessment (McDonald 1968:182-189). A section of this railway line traverses the proposed activity area.

6.3 Previously Recorded Heritage Items

Searches have been conducted for previous heritage listings in and around the study area; these searches have included all of the relevant heritage registers for items of local through to world significance. Details of these searches are provided below.

Australian Heritage Database

This database contains information about more than 20 000 natural, historic and Indigenous places. The database includes places in:

- the World Heritage List
- the National Heritage List
- the Commonwealth Heritage list
- the Register of the National Estate

and places under consideration for any one of these lists. A search of this database (31st August 2011) revealed that there are 42 items listed on the Register of the National Estate as being present in the Wellington LGA. None of these items are in the Bodangora proposal area.

State Heritage Inventory

The *NSW heritage databases* contain over 20,000 statutorily-listed heritage items in New South Wales. This includes items protected by heritage schedules to local environmental plans (LEPs), regional environmental plans (REPs) or by the State Heritage Register.

The information is supplied by local councils and State agencies and includes basic identification details and listing information. Consequently listings should be confirmed with the responsible agency.

A search of this database (31st August 2011) revealed that there are 59 heritage items that are listed as being present within the Wellington Shire Council LGA. Of these, there are three items that are in, or in some proximity to, the Bodangora proposal area (Table 2). All of the items in question are listed as being on the Wellington Shire Council local government register.

Table 2 State Heritage Inventory search results

Item Name	Suburb	LGA	Significance
Bodangora Gold Mine Former Remains - Chimney, Shaft & Engine Footings	Bodangora	Wellington	LGOV
Sandy Hollow to Maryvale Railway	Sandy Hollow and Maryvale	Wellington	LGOV
St. Paul's Catholic Church	Bodangora	Wellington	LGOV Register of the National Estate

The NSW Heritage Act (1977)

The purpose of the NSW Heritage Act 1977 is to ensure that the heritage of New South Wales is adequately identified and conserved. In practice the Act has focused on items and places of non-indigenous heritage to avoid overlap with the NSW National Parks & Wildlife Act, 1974, which has primary responsibilities for nature conservation and the protection of Aboriginal objects and places in NSW. In recent years, however, the Heritage Council has targeted these other areas, working with relevant state agencies such as NPWS to identify gaps in the protection of Aboriginal and natural heritage places (for example the Cyprus Hellene Club was protected under the Heritage Act as a place of historic significance to Aboriginal people amongst other values).

Section 4 of the Act considers a heritage item to include *any place, building, work, relic, movable object, which may be of historic, scientific, cultural, social, archaeological, natural or aesthetic value.*

The Heritage Amendment Act 1998 came into effect in April 1999. This Act instigated changes to the NSW heritage system, which were the result of a substantial review begun in 1992. A central feature of the amendments was the clarification and strengthening of shared responsibility for heritage management between local government authorities, responsible for items of local significance, and the NSW Heritage Council. The Council retained its consent powers for alterations to heritage items of state significance.

The Heritage Act is concerned with all aspects of conservation ranging from the most basic protection against damage and demolition, to restoration and enhancement. It recognises two levels of heritage significance, State significance and Local significance across a broad range of values.

Generally this Act provides protection to items that have been identified, assessed and listed on various registers including State government section 170 registers, local government LEPs and the State Heritage Register. The Interim Heritage Order provisions allow the minister or his delegates (local government may have delegated authority) to provide emergency protection to threatened places that have not been previously identified. The only 'blanket' protection

provisions in the Act relate to the protection of archaeological deposits and relics greater than 50 years old.

The Heritage Council of NSW

The role of the Heritage Council is to provide the Minister with advice on a broad range of matters relating to the conservation of the heritage of NSW. It also has a role in promoting heritage conservation through research, seminars and publications. The membership of the Heritage Council is designed to reflect a broad range of interests and areas of expertise.

Interim Heritage Orders

Under the provisions of Part 3 of the Act, the Minister can make an interim heritage order (IHO). A recommendation with respect to an order can come from the Heritage Council, either based on a request for the Minister, or the Council's own considerations. The Minister can also authorise Local Councils to make IHOs within their area. An interim conservation order may remain in force for up to 12 months, until such time as it is revoked or the item is listed on the State Heritage Register. A heritage order may control activities such as demolition of structures, damage to relics, places or land, development and alteration of buildings, works or relics.

The State Heritage Register

Changes to the Heritage Act in the 1998 amendments established the State Heritage Register which includes all places previously protected by permanent conservation orders (PCOs) and items identified as being of state significance in heritage and conservation registers prepared by State Government instrumentalities. Sites or places which are found to have a state level of heritage significance should be formally identified to the Heritage Council and considered for inclusion on the State Heritage Register.

National Trust of Australia (NSW) Register

The National Trust of Australia (NSW) is a non-government Community Organisation which promotes the conservation of both the built and natural heritage (for example, buildings, bushland, cemeteries, scenic landscapes, rare and endangered flora and fauna, and steam engines may all have heritage value). The Trust has approximately 30,000 members in New South Wales.

Following its survey and assessment of the natural and cultural environment, the Trust maintains a Register of landscapes, townscapes, buildings, industrial sites, cemeteries and other items or places which the Trust determines to have heritage significance and are worthy of conservation. Currently there are some 11,000 items listed on the Trust's Register. They are said to be 'Classified'.

The Trust's Register is intended to perform an advisory and educational role. The listing in the Register has no legal force. However, it is widely recognised as an authoritative statement of the heritage significance of a place. The Trust does not have any control over the development or demolition of the Classified Places or Items in its Register.

While the National Trust Register does not provide any statutory obligations for protection of a site as such, the acknowledgment of a place being listed on the Register as a significant site lends weight to its heritage value. Also, the fact that the actual data for sites may be minimal does not diminish the significance of a place. In fact, many sites were listed with only basic data added, especially in the early developmental stages of the Register.

The Trust, over the last few years has been upgrading the information for places listed, with criteria for assessment for listing based on the Australian Heritage Commission Criteria of assessment for entry to the Register of the National Estate.

A search of the National Trust of Australia (NSW) Register (31st August 2011) revealed that while there are two items listed within the Wellington LGA there are no heritage items currently listed as being present in or directly adjacent the proposal area.

6.4 Historical Themes

A historical theme is a way of describing a major historical event or process that has contributed to the history of NSW. Historical themes provide the background context within which the heritage significance of an item can be understood. Themes have been developed at National and State levels, but corresponding regional and local themes can also be developed to reflect a more relevant historical context for particular areas or items. A summary of themes that are applicable to the study area are listed in the table below (Table 3).

Table 3 National, state and local historical themes applicable to the study area and surrounds.

Australian Theme	NSW Theme	Local Theme
Peopling Australia	Aboriginal cultures and interactions with other cultures	Day-to-day life
		Mythological and ceremonial
		Natural resources
		Contact period
Developing local, regional and national economies	Agriculture	Fencing
		Sheds
		Pasture
		Water provision
		Farmsteads
		Shearing
		Machinery
	Commerce	Banking
		Trade routes
		Shops
		Inns
	Communication	Postal services
		Telephone and telegraph services
		Newspapers
		Transport networks
	Environment – cultural landscape	Tree plantings
		Picnic areas
		Fishing spots
	Events	Floods
	Exploration	Camp sites
		Exploration routes
		Water sources
	Industry	Mills
		Shearing sheds
		Workshops
		Transport networks
		Mines
		Quarries

Australian Theme	NSW Theme	Local Theme
		Lime kilns
		Miners' camps
		Processing plants
	Pastoralism	Pastoral homesteads
		Sheds and yards
		Travelling stock reserves
		Fencing and boundaries
		Pastoral workers' camps
		Water sources
	Technology	Communication networks
	Transport	Railways
		Early roads
		Private tracks
		Coaches and teamsters
		Bridges
Building settlements, towns and cities	Towns, suburbs and villages	Town plan
		Neighbourhoods
	Land tenure	Fencing and other boundary markers
	Utilities	Water distribution
		Garbage disposal
		Sewage/septic systems
		Provision of electricity
		Bridges
		Culverts
	Accommodation	Inns and hostels
		Domestic residences
		Temporary encampments
		Homesteads
		Humpies
Developing Australia's cultural life	Domestic life	Domestic artefact scatters
		Residences
		Food preparation
		Gardens
		Domesticated animals
	Leisure	Show grounds
		Picnic/camping areas
		Racecourse
		Scenic lookouts
		Town halls
		Tourism
	Religion	Churches
	Social institutions	Public hall
		Social groups/associations
	Sport	Sports grounds
		Sports teams
Marking the phases of life	Birth and death	Graves
	Persons	Individual monuments
		Significant individuals/families
		Place names

6.5 Predictive Statements

While Table 3, above, lists a wide variety of themes that are important contextually to the history and heritage of the Bodangora proposal area, the themes of direct relevance to this project can be broken down into the following broad categories:

- Agriculture/Pastoralism
- Mining
- Transport/Communications

Agriculture/Pastoralism

The land in and around the study area has been used by Europeans for agricultural purposes for over 180 years. Sheep grazing has been the primary industry during that period however cattle grazing and the growing of crops have also contributed to the local economy. There is a high potential for additional items associated with this theme to be present in the study area.

Potential heritage item types are likely to include homesteads, sheds, yards, fences, ploughlands, dams, gardens, roads and tree plantings. These items may be present as extant/standing features or ephemeral remnants. Such items may have archaeological research potential and historical/social significance. The location of such features is difficult to predict, although it might be expected that the potential will increase in and around existing homestead complexes, and along property boundaries and drainage lines.

Mining

The study area is located within a broader area where mining, especially for gold, has taken place since the mid 1800s. There is a high potential for features and items associated with this theme to be present in the study area.

Transport/Communications

Sections of the uncompleted Sandy Hollow to Maryvale Railway are known to be present within the study area.

Summary

There is a high probability that potential heritage items might be present within the study area. The themes that such items are most likely associated with are agriculture/pastoralism, mining and transport/communications. Additional items may be present as extant/standing structures or ephemeral sites and ruins. The location of such items is difficult to predict. It should be noted that while there is a high potential for such items to occur, this does not necessarily indicate that any items which may be present will be of sufficient significance to warrant heritage listing.

7. FIELD SURVEY RESULTS

In accordance with the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*, the purpose of a field survey is to record the material traces and evidence of Aboriginal land use that are:

- Visible at or on the ground surface, or
- Exposed in section or visible as features (e.g. rock shelters with rock-art),

and to identify those areas where it can be inferred that, although not visible, material traces have a high likelihood of being present under the ground surface (DECCW 2010a: 12).

The field survey strategy, and results, are set out in this section of the report.

7.1 Sampling Strategy and Methods

The archaeological survey entailed a comprehensive pedestrian and vehicle traverse survey which was undertaken by five people over a four day period.

The field survey was aimed at locating Aboriginal objects, areas and places, and Non-Aboriginal heritage items. An assessment was also made of prior land disturbance, survey coverage variables (ground exposure and archaeological visibility) and the potential archaeological sensitivity of the land.

Field survey was designed to assess the archaeological sensitivity of the entire proposal area. The pedestrian survey methodology entailed walking parallel transects across individual Survey Units with each surveyor situated ca. 10 – 20 metres apart. Each Survey Unit was surveyed until the entire area had been systematically inspected. This methodology enabled direct visual inspection of as much of the ground surface of the proposal area as practicable. The majority of the proposed impact area was subject to pedestrian survey.

A vehicle traverse survey was conducted in a few select areas which had been determined to be of low archaeological sensitivity based on a consideration to their environmental location, and where impacts were low (e.g. existing roads which are proposed to be used for construction and maintenance access). In the analyses, pedestrian survey and vehicle traverses are reported separately.

The approach to recording in the current study has been a 'nonsite' methodology: the elementary unit recorded is an artefact rather than a site (*cf* Dunnell 1993; Shott 1995). The rationale behind this approach is that artefacts may be directly observed, however, 'sites' are a construction within an interpretative process. Given that it can be expected that full archaeological visibility will not be encountered during the survey, the process of identifying site boundaries (if they exist at all) will not be possible.

The density and nature of the artefact distribution will vary across the landscape in accordance with a number of behavioural factors which resulted in artefact discard. While cultural factors will have informed the nature of land use, and the resultant artefact discard, environmental variables are those which can be utilised archaeologically in order to analyse the variability in artefact density and nature across the landscape. Accordingly, in this study, while the artefact is the elementary unit recorded, it is the Survey Unit which is utilised as a framework of recording, analysis, and management (*cf* Wandsnider and Camilli 1992). The study area has been divided into 31 Survey Units, each of which have been defined according to broad landform morphological types (as defined below).

The field recording and mapping has been conducted using a mobile GIS system. The location of Aboriginal and Non-Aboriginal locales and Survey Units has been made using ArcGIS software and a Trimble GPS. In order to ensure consistency in data collection, all field records were made in Microsoft Access databases formulated specifically for the Bodangora Wind Farm project. Three separate forms were used for recording Survey Unit data, Aboriginal Object data and Historical features data. The data collected forms the basis for the documentation of survey results which is presented below. The variables recorded are defined below:

Survey Unit Variables

Landscape variables utilised are conventional categories taken from the *Australian Soil and Land Survey Field Handbook* (McDonald *et al*. 1998). The following landform variables were recorded:

Morphological type:
- Crest: - element that stands above all or almost all points in the adjacent terrain – smoothly convex upwards in downslope profile. The margin is at the limit of observed curvature.
- Simple slope: - element adjacent below crest or flat and adjacent above a flat or depression.
- Flat: - planar element, neither crest or depression and is level or very gently inclined.

Gradient - Slope class and value:
- Level 0 - 1%.
- Very gentle 1 - 3%.
- Gentle 3 – 10%.
- Moderate 10 – 32%.

Geology
The type of geology has been recorded and as well the abundance of rock outcrop – *as defined below*. The level of visual interference from background quartz shatter was noted.
- No rock outcrop - no bedrock exposed.
- Very slightly rocky - <2% bedrock exposed.
- Slightly rocky - 2-10% bedrock exposed.
- Rocky - 10-20 % bedrock exposed.
- Very rocky - 20-50% bedrock exposed.

Soil
Soil type and depth was recorded. The potential for soil to contain subsurface archaeological deposit (based on depth) was recorded. This observation is based solely on the potential for soil to contain artefacts; it does not imply that artefacts will be present or absent.

Geomorphological processes
The following gradational categories were possible:
- eroded
- eroded or aggraded
- aggraded

Geomorphological agents
The following geomorphological agents were recorded:
- precipitation: *creep; landslide; sheet flow*
- wind
- biological: *human; nonhuman*

Survey coverage variables were also recorded; these are described further below. The archaeological sensitivity of each Survey Unit was defined according to assessed artefact density

as negligible, very low, low, low/moderate or moderate. The proposed impacts are also noted for each Survey Unit.

Aboriginal Object Recording

For the purposes of defining the artefact distribution in space it has been labeled as a locale (eg. Survey Unit 1/Locale 1). GPS referenced locational information was captured as WGS84 readings and transformed to GDA coordinates.

The measurable area in which artefacts were observed has been noted and if relevant, a broader area encompassing both visible and predicted subsurface artefacts has been defined. In addition locale specific assessments of survey coverage variables have been made. The prior disturbance to the locale has been noted as low, moderate or high. Artefact numbers in each locale have been recorded and a prediction of artefact density noted, based on observed density taking into consideration Effective Survey Coverage, and a consideration of the environmental context.

Artefact density has been defined in arbitrary categories (based on a consideration of artefact density calculated in detailed subsurface work conducted elsewhere) as follows;

- Negligible: insignificant
- Very low: <1 artefact per square metre;
- Low: between 1 and 10 artefacts per square metre.

The potential for soil to contain subsurface archaeological deposit (based on depth) was recorded. Similarly to Survey Unit recordings this observation is based solely on the potential for soil to contain artefacts; it does not imply that subsurface artefacts will be present or absent, nor does it refer to a prediction of artefact density.

Survey Coverage Variables

Survey Coverage Variables are a measure of ground surveyed during the study and the type of archaeological visibility present within that surveyed area. Survey coverage variables provide a measure with which to assess the effectiveness of the survey so as to provide an informed basis for the formulation of management strategies.

Specifically, an analysis of survey coverage is necessary in order to determine whether or not the opportunity to observe stone artefacts in or on the ground was achieved during the survey. In the event that it is determined that ground exposures provided a minimal opportunity to record stone artefacts it may be necessary to undertake archaeological test excavation for determining whether or not stone artefacts are present. Conversely, if ground exposures encountered provided an ideal opportunity to record the presence of stone artefacts, the survey results may be considered to be adequate and accordingly no further archaeological work may be required.

The survey coverage data includes an estimate of the area surveyed within a Survey Unit, that is, the area subject to actual inspection; the surveyed area is always less than the Survey Unit in area given that not all parts of a Survey Unit are visually examined.

Two variables were used to measure ground surface visibility during the study; the area of ground exposure encountered and the quality and type of ground visibility (archaeological visibility) within those exposures. The survey coverage variables estimated during the survey are defined as follows:

Ground Exposure – an estimate of the total area inspected which contained exposures of bare ground; and

Archaeology Visibility – an estimate of the average levels of potential archaeological surface visibility within those exposures of bare ground. Archaeological visibility is generally less than ground exposure as it is dependent on adequate breaching of the bare ground surface which provides a view of the subsurface soil context. Based on subsurface test excavation results conducted in a range of different soil types across the New South Wales southeast it is understood that artefacts are primarily situated within 10 - 30 cm of the ground profile; reasonable archaeological visibility therefore requires breaching of the ground surface to at least a depth of 10 cm (see Dibden 2005a; 2005b, and 2005c).

Based on the two visibility variables as defined above, an estimate (Net Effective Exposure) of the archaeological potential of exposure area within a Survey Unit has been calculated. The Effective Survey Coverage (ESC) calculation is a percentage estimate of the proportion of the Survey Unit which provided the potential to view archaeological material.

7.2 Survey Units

The development area has been divided into 31 Survey Units. These Survey Units are described in Table 4; their location is shown in Figures 7 - 10. Plates 4 - 25 illustrate the landscape context of the proposed activity areas.

The majority of Survey Units are sections of large, broad amorphous landforms. The scale of the landforms is such that Aboriginal activities are likely to have occurred anywhere, rather than having been focalised at a single locale. That is, nether the landforms themselves, nor specific areas within landforms, are likely to have been focal points of human activity in the landscape. The majority of turbines are located on broad crest landform elements. Access tracks traverse crests, simple slopes and cross drainage depressions.

The watercourses which drain the landforms are all low order streams. In proposed turbine areas, these are 1st order and, accordingly, ephemeral and are unlikely to hold water, even immediately after rain. Given the absence of any obvious potable water in the proposed activity areas, it is predicted that Aboriginal land use would have been restricted to activities such as hunting and gathering forays, conducted away from base camps and areas of more permanent habitations. The nature of such activities, is such, that artefact associated discard would generally dispersed, and of low to very low density. Artefact complexity may also be generally restricted, reflecting the limited range of activities being undertaken in such areas.

At the time of the field survey, ground surfaces were generally well covered with dead and spent summer grass (see, for example, Plate 4). Thistle infestations were common, and these in combination with grass cover, acted to considerably lessen Effective Survey Coverage (for example, Photo 5). Ground exposure was frequently found to be low, and in some cases, negligible or entirely absent. However, where ground surfaces were breached, exposures usually presented a relatively complete view of soil profiles (archaeological visibility i.e. the potential artefact bearing soil).

While the majority of the proposed activity area was covered with old pasture at the time of field survey, there were some paddocks that had been given over to recent cultivation.

Across the entire proposal area, piles of cobbles, resulting from farmers cleaning up paddocks, probably over many generations, were frequently encountered. These attest to the generally rocky nature of the landscape. The shale country in the east of the proposal area, generally possesses very thin or negligible soil profiles. Low outcrops occur and the ground surfaces are comprised of shattered shale.

The landscape can be summarised as exposed, elevated and generally amorphous country, which is rocky and possesses limited potable water.

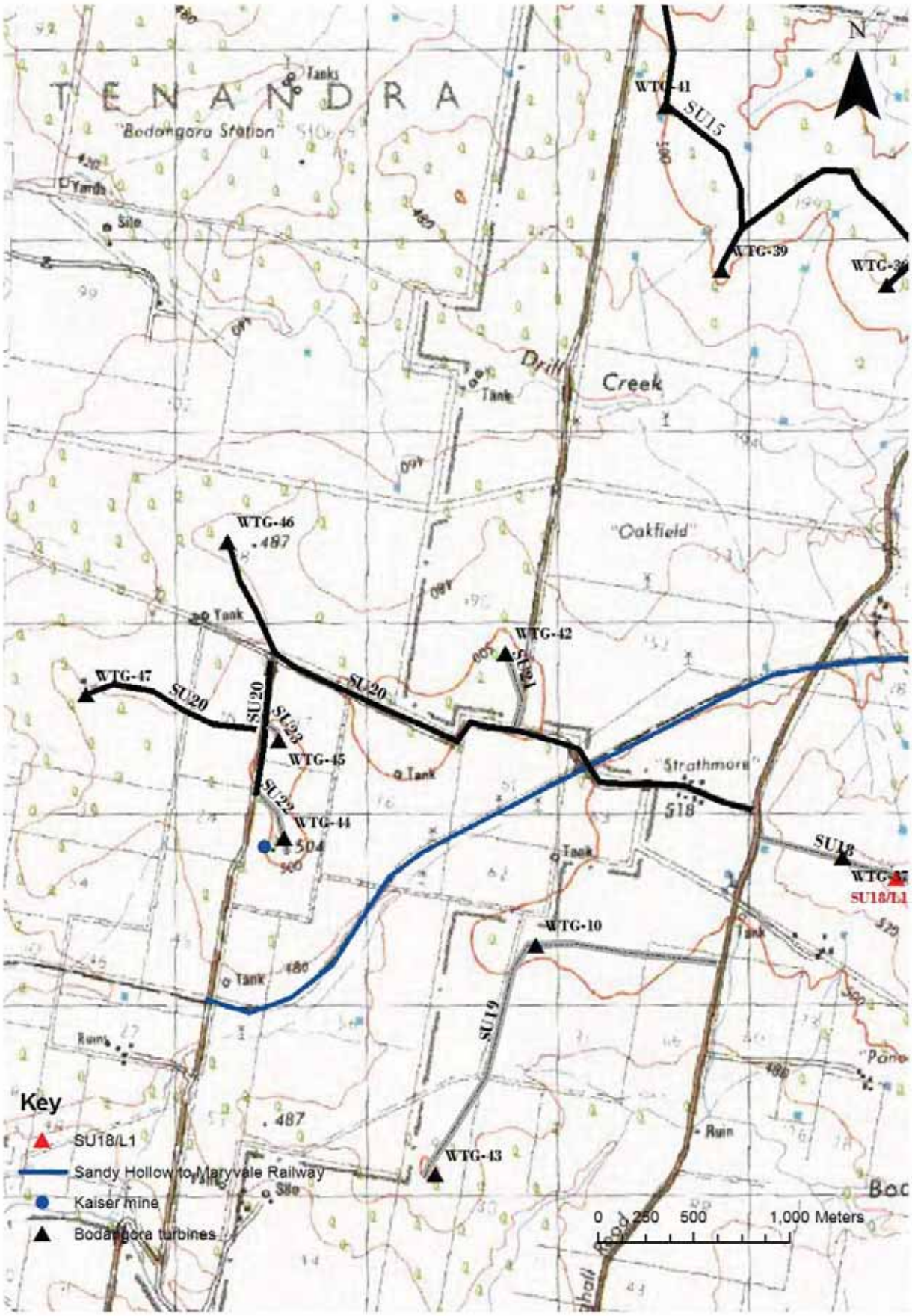

Figure 7 Location of Survey Units and Aboriginal and Non-Aboriginal sites: western area (compiled with GIS provided by the proponent and mobile GIS data captured during fieldwork and mapping from *Topoview Raster 2006* NSW Dept of Lands).

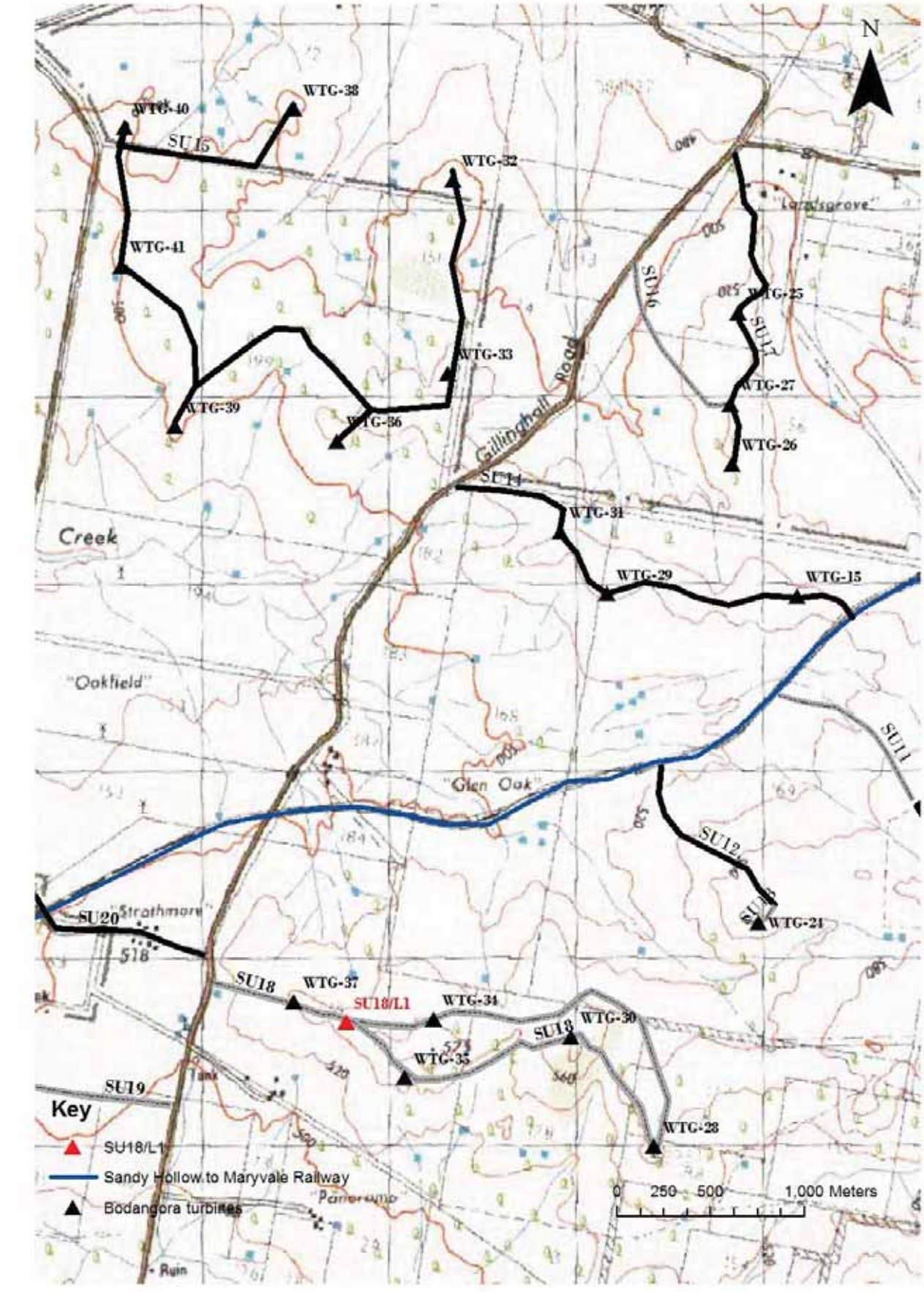

Figure 8 Location of Survey Units and Aboriginal and Non-Aboriginal sites: central area.

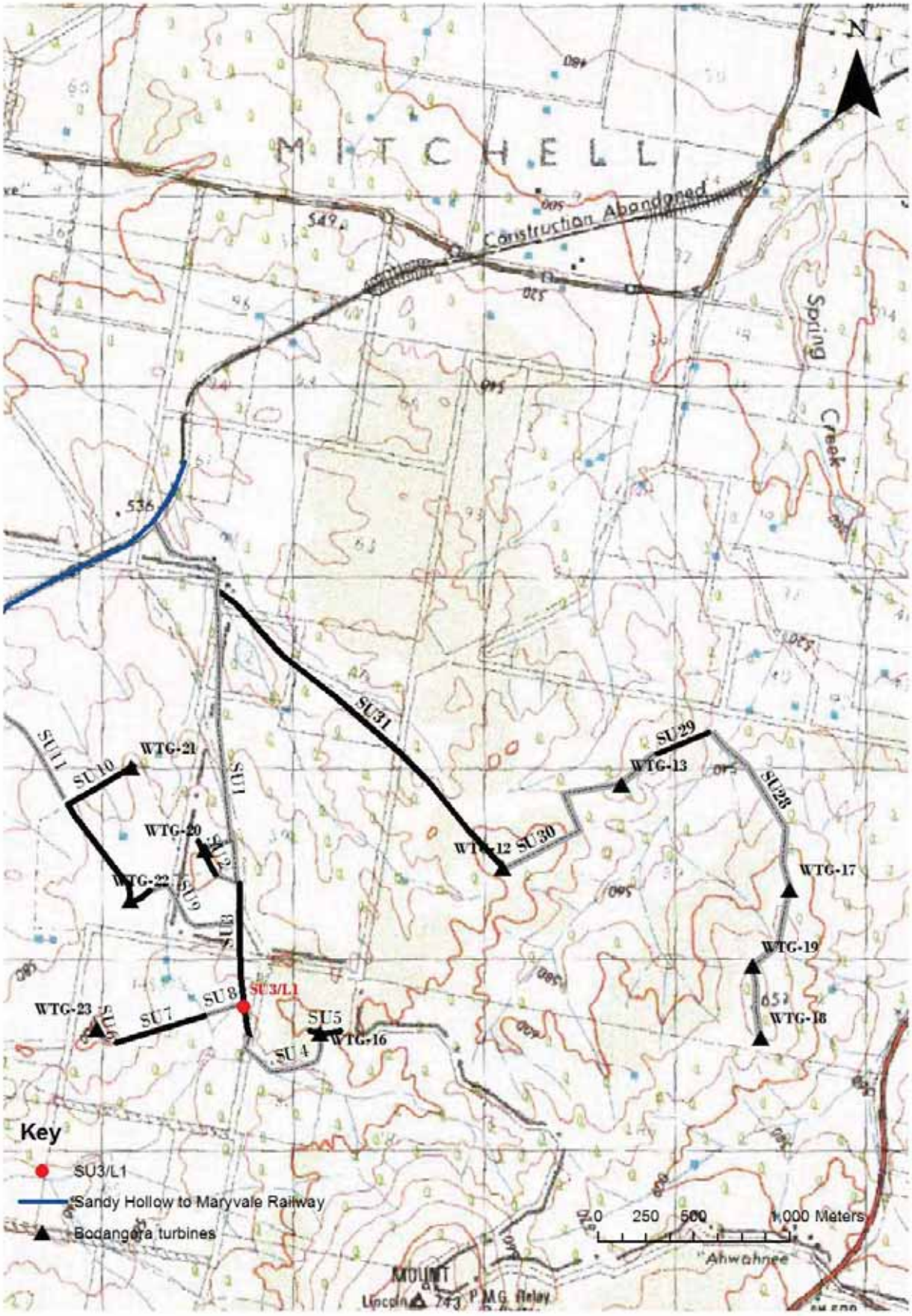

Figure 9 Location of Survey Units and Aboriginal and Non-Aboriginal sites: eastern area.

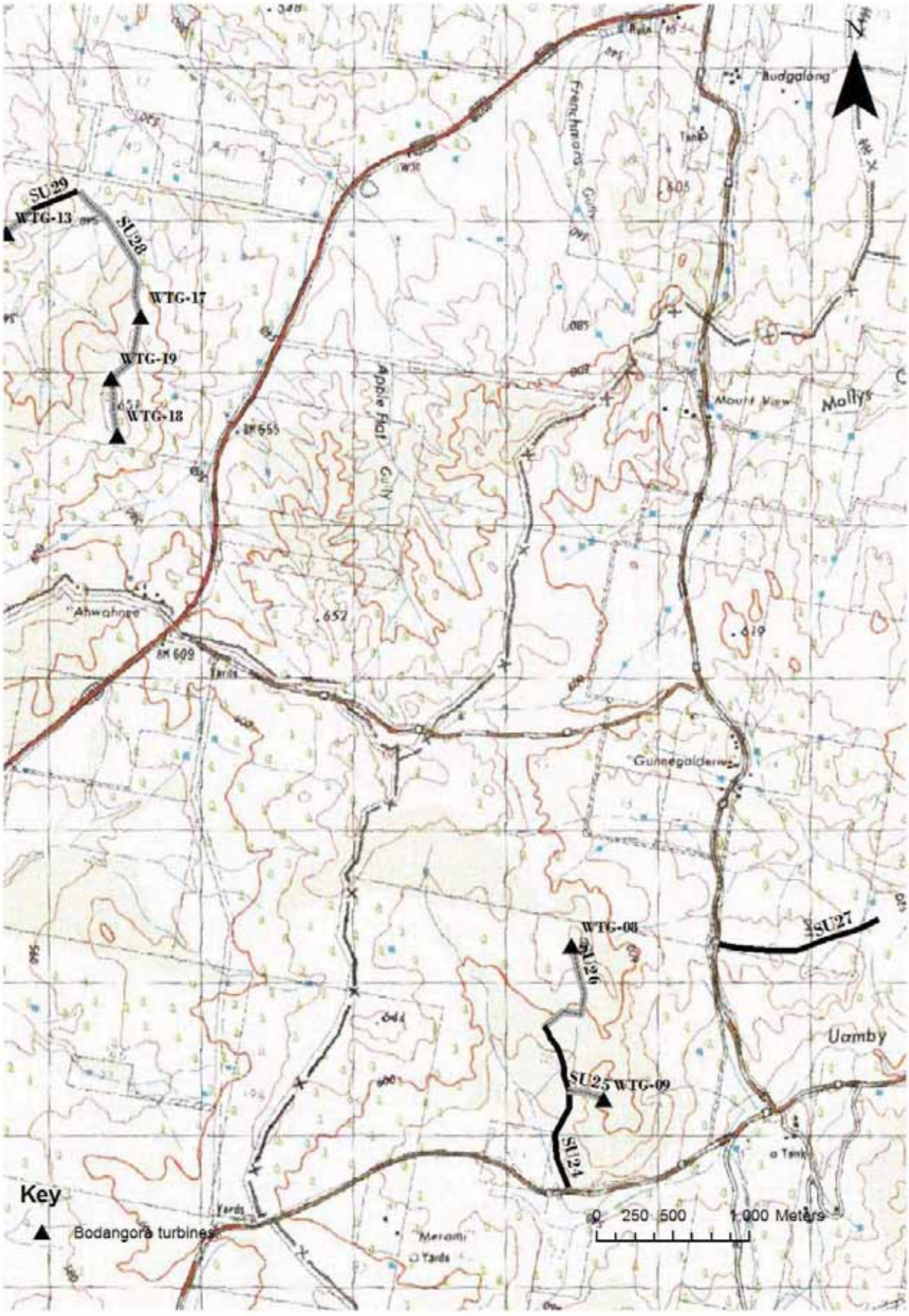

Figure 10 Location of Survey Units: south-eastern area.

Table 4 Survey Unit descriptions.

Survey Unit	Assessment type	Proposed impacts	Landform/ Aspect/gradient	Geology	Rock abundance	Soil	Geomorphology	Disturbance	Predicted artefact density
SU1 Plate 4	Pedestrian	Access	Simple slope/ 60°/ gentle - Broad amorphous landform	Sedimentary – shale with some milky quartz	Rocky; rock present as shale shatter with minor above-ground outcrops	Skeletal, lithosol	Eroded; precipitation - sheet flow; human and animal	High: farming, track grading & vehicle usage; erosion	Very low; soil is shallow & there is no potential for deposit
SU2 Plate 5	Pedestrian	Access & turbine #20	Crest/320°/ very gentle - Reasonably narrow (c. 50 m) crest.	Basalt	Rocky; rock present as cobbles & shatter with minor above-ground outcrops	loam	Eroded; wind; human and animal	High: farming & vehicle usage; erosion	Very low; soil is shallow, rocky & there is low potential for deposit
SU3 Plate 6	Pedestrian	Access	Crest/open/ very gentle - Broad amorphous landform	Sedimentary – shale with minor milky quartz	Rocky; rock present as shale shatter with minor above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, track grading & vehicle usage; erosion	Low and patchy; soil is shallow & there is no potential for deposit
SU4 Plate 7	Pedestrian	Access	Simple slopes/180°/ Gentle – Undulating	Sedimentary – shale with minor milky quartz	Very rocky; rock present as shale shatter with frequent above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming & erosion	Very low; soil is shallow & there is no potential for deposit
SU5 Plate 8	Pedestrian	Turbine #16	Crest/open/very gentle – Undulating, narrow crest	Sedimentary – shale	Very rocky; rock present as shale shatter with frequent above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming & erosion	Very low; soil is shallow (virtually absent) & there is no potential for deposit
SU6 Plate 9	Pedestrian	Turbine #23	Crest/330°/very gentle – Narrow crest	Sedimentary – shale	Very rocky; rock present as cobbles	Skeletal, lithosol	Eroded; wind; human and animal	High: farming & erosion	Very low; soil is shallow, rocky & there is low potential for deposit
SU7 Plate	Pedestrian	Access	Simple slope/60°/ gentle - Broad	Sedimentary – shale	Rocky; rock present as shale	Skeletal, lithosol	Eroded; wind; precipitation - sheet	High: farming, erosion	Very low; soil is shallow & there

Survey Unit	Assessment type	Proposed impacts	Landform/ Aspect/gradient	Geology	Rock abundance	Soil	Geomorphology	Disturbance	Predicted artefact density
10			amorphous landform		shatter with minor above-ground outcrops		flow; human and animal		is low potential for deposit
SU8	Pedestrian	Access	Simple slope/ 200°/gentle - Broad amorphous landform	Sedimentary – shale	Rocky; rock present as shale shatter	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Very low; soil is shallow & there is low potential for deposit
SU9	Pedestrian	Access	Simple slope/ 200°/gentle - Broad amorphous landform – upper slope	Sedimentary – shale	Rocky; rock present as shale shatter and sparse cobbles	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, vehicle track; erosion	Very low; soil is shallow & there is low potential for deposit
SU10 Plate 11	Pedestrian	Access & WTG 22	Crest/open/ very gentle - Broad amorphous landform	Volcanic – granite	Rocky; rock present as shatter, cobbles with minor above-ground outcrops	Gravelly loam	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, track & vehicle usage; erosion	Low; soil is shallow
SU11 Plate 12	Pedestrian	Access	Simple slope/ 310°/gentle - Broad amorphous landform	Volcanic – granite	Rocky; rock present as shatter, cobbles with minor above-ground outcrops	Gravelly loam	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, track & vehicle usage; erosion	Very low; soil is shallow
SU12	Pedestrian and vehicle	Access	Simple slope/ 300°/gentle - Broad amorphous landform	Volcanic – granite	Rocky; rock present as shatter, cobbles with minor above-ground outcrops	Gravelly loam	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Very low; soil is shallow
SU13 Plates 13 and 14	Pedestrian	WTG 24	Crest/open/ very gentle - Knoll	Volcanic – granite	Rocky; rock present as shatter, cobbles with above-ground outcrops	Gravelly loam	Eroded; wind; human and animal	High: farming, erosion	Low; soil is shallow
SU14 Plate	Pedestrian	Access & WTGs 15,	Crest/open/ gentle -	Sedimentary – shale	Rocky; rock present as shale	Skeletal, lithosol	Eroded; wind; precipitation - sheet	High: farming, erosion	Very low; soil is shallow & there

Survey Unit	Assessment type	Proposed impacts	Landform/ Aspect/gradient	Geology	Rock abundance	Soil	Geomorphology	Disturbance	Predicted artefact density
15		29 & 31	Undulating with a series of knoll on which turbines proposed		shatter and sparse cobbles		flow; human and animal		is low potential for deposit
SU15 Photos 16 and 17	Pedestrian	Access & WTG's 32, 33, 36, 39, 41, 40 & 38	Crest/open/very gentle to gentle - Broad amorphous undulating landform	Sedimentary – shale	Rocky; rock present as shale shatter and sparse cobbles with minor above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, track grading & vehicle usage; erosion	Low; soil is shallow
SU16	Vehicle & Pedestrian	Access	Simple slope/270°/ gentle - Broad amorphous landform	Sedimentary – shale	Rocky; rock present as shale shatter and sparse cobbles	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Low; soil is shallow
SU17	Pedestrian	Access & WTG's 25, 26 & 27	Crest/open/very gentle	Sedimentary – shale	Rocky; rock present as shale shatter and sparse cobbles with minor above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, track grading & vehicle usage; erosion	Low; soil is shallow
SU18 Plates 18 and 19	Pedestrian	Access & WTG's 28, 30, 34, 35 & 37	Crest/open/ very gentle to gentle - Broad amorphous undulating landform	Volcanic – granite	Rocky; rock present as shatter, cobbles with above-ground outcrops	Gravelly loam	Eroded; wind; human and animal	High: farming, erosion	Low; soil is shallow
SU19 Plate 20	Pedestrian	Access & WTG's 43 & 10	Crest/open/ very gentle to gentle - Broad amorphous undulating landform	Sedimentary – shale	Rocky; rock present as shale shatter and sparse cobbles with minor above-ground outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Low; soil is shallow
SU20 Plate	Vehicle with spot	Access along	Crest/open/ very gentle –	Sedimentary – shale	Rocky; rock present as shale	Skeletal, lithosol	Eroded; wind; precipitation - sheet	High: farming, vehicle grading	Low; soil is shallow

Survey Unit	Assessment type	Proposed impacts	Landform/ Aspect/gradient	Geology	Rock abundance	Soil	Geomorphology	Disturbance	Predicted artefact density
21	checks	existing road and WTG's 46 & 47	Broad amorphous undulating landform		shatter and sparse cobbles		flow; human and animal	and use; erosion	
SU21	Pedestrian	Access and WTG 42	Crest/open/ very gentle – Knoll on an amorphous undulating landform	Sedimentary – shale	Very rocky; rock present as shale shatter and abundant cobbles	Skeletal, lithosol	Eroded; wind; human and animal	High: farming, vehicle grading and use; erosion	Low; soil is shallow
SU22	Pedestrian	Access and WTG 44	Crest/open/ very gentle – Amorphous undulating landform	Sedimentary – shale	Rocky; rock present as shale shatter and cobbles	Skeletal, lithosol	Eroded; wind; human and animal	High: farming, erosion	Low; soil is shallow
SU23	Pedestrian	Access and WTG 45	Crest/open/ very gentle – Amorphous undulating landform	Sedimentary – shale	Rocky; rock present as shale shatter and cobbles	Skeletal, lithosol	Eroded; wind; human and animal	High: farming, erosion	Low; soil is shallow
SU24	Pedestrian	Access	Simple slope/270°/gentle	Volcanic – granite	Rocky; rock present as shatter, cobbles with minor above-ground outcrops	Gravelly loam	Eroded; wind; human and animal	High: farming, vehicle track; erosion	Low
SU25	Pedestrian	Access and WTG 9	Crest/open/ Gentle to moderate – Narrow, rocky undulating landform	Volcanic – granite	Very rocky; rock present as shatter, cobbles with abundant above-ground outcrops	Gravelly loam	Eroded; wind; human and animal	High: farming, erosion	Very low; very rocky
SU26 Plate 22	Pedestrian	Access and WTG 8	Crest/180°/ gentle to moderate –	Volcanic – granite	Very rocky; rock present as shatter, cobbles with	Gravelly loam	Eroded; wind; human and animal	High: farming, erosion	Very low; very rocky

Survey Unit	Assessment type	Proposed impacts	Landform/ Aspect/gradient	Geology	Rock abundance	Soil	Geomorphology	Disturbance	Predicted artefact density
			Narrow, rocky undulating landform		abundant above-ground outcrops				
SU27	Vehicle with spot checks	Access & substation	Crest/open/ Gentle to moderate – Narrow, rocky undulating landform	Sedimentary - shale	Rocky; rock present as shale shatter and outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, vehicle; erosion	Low; soil is shallow
SU28 Plate 23	Pedestrian	Access & WTG's 17, 18 & 19	Crest/open/ Gentle to moderate – Undulating landform	Sedimentary - shale	Rocky; rock present as shale shatter and cobbles	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Low; soil is shallow
SU29	Pedestrian	Access	Simple slope/60°/ Moderate to steep	Sedimentary - shale	Rocky; rock present as shale shatter, cobbles and minor outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Low; soil is shallow
SU30 Plate 24	Pedestrian	Access & WTG's 12 & 13	Crest/open/ Gentle to moderate – Undulating landform	Sedimentary - shale	Rocky; rock present as shale shatter cobbles and minor outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, vehicle; erosion	Low; soil is shallow
SU31 Plate 25	Vehicle with spot checks	Access	Simple slope/270°/ Gentle to moderate – Broad amorphous landform	Sedimentary - shale	Rocky; rock present as shale shatter, cobbles and minor outcrops	Skeletal, lithosol	Eroded; wind; precipitation - sheet flow; human and animal	High: farming, erosion	Low; soil is shallow

Plate 4 Survey Unit 1; photo taken from near south end and is looking north.

Plate 5 Part of Survey Unit 2 looking 310° towards crest and location of proposed WTG#20. Note thick thistle infestation and absence of ground exposure.

Plate 6 Survey Unit 3 looking south from north end.

Plate 7 Survey Unit 4 looking east.

Plate 8 Survey Unit 5 looking west to proposed WTG #16.

Plate 9 Survey Unit 6 and location of proposed WTG #23; looking 300°.

Plate 10 Survey Unit 7 from west end looking 55°.

Plate 11 Survey Unit 10 taken from near north end and looking 120°.

Plate 12 Survey Unit 11 looking 130°.

Plate 13 Location of proposed WTG #24 in distance taken from south end of SU11 looking 230°.

Plate 14 Survey Unit 13 and location of proposed WTG #24 looking north.

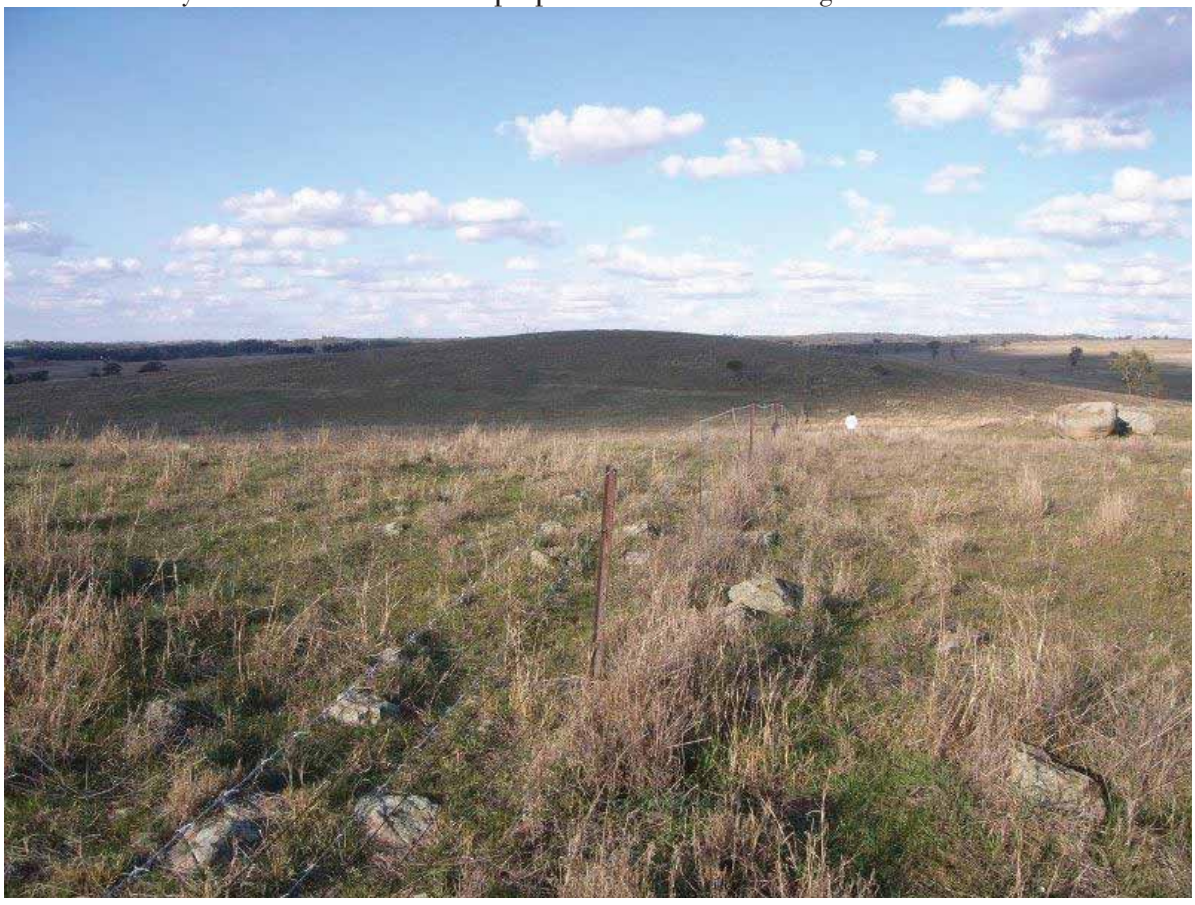

Plate 15 Survey Unit 14 taken from just east of WTG #29 and looking towards WTG #15 in an easterly direction.

Plate 16 Survey Unit 15 and location of WTG #39, looking south.

Plate 17 Survey Unit 15 looking east from just south of WTG #40.

Plate 18 Survey Unit 18 and location of proposed WTG #28 on small knoll in background; looking 140°.

Plate 19 Survey Unit 18 looking to proposed WTG #34 site; looking 30°.

Plate 20 Survey Unit 19 looking south.

Plate 21 North-west end of Survey Unit 20 at site of proposed WTG #46; looking east.

Plate 22 Survey Unit 26 looking 180° from proposed WTG site #8.

Plate 23 Survey Unit 28 looking north from proposed WTG #19 site towards WTG #17 in middle distance.

Plate 24 Survey Unit 30 looking 130° towards proposed WTG #13 in middle distance.

Plate 25 Survey Unit 31 looking 130°.

7.3 Survey Results, Analysis and Discussion

A corridor, approximately 100 metres wide, was inspected during the field survey. Accordingly, the total area subject to archaeological assessment measured c. 351.7 hectares (Table 5). It is estimated that approximately 44.3 hectares of that area was subject to actual visual perusal of ground surfaces.

The survey area was generally thickly grassed and ground exposures encountered are estimated to have measured c. 1.5 hectares in area. Of that area, archaeological visibility (the potential artefact bearing soil profile) is estimated to have been c. 1.2 hectares. Effective Survey Coverage (ESC) is calculated to have been 0.3% of the survey area. The low ESC is directly attributable to the thick grass cover.

One Aboriginal object locale, a scatter of stone artefacts (SU3/L1), and a possible stone procurement area (SU18/L1) were recorded in the proposed impact areas. Their location is shown on Figures 8 and 9, respectively. The dearth of Aboriginal object recordings is almost certainly a reflection of low ESC, rather than a true absence of Aboriginal objects. However, it is estimated that any unrecorded objects (stone artefacts) present in the area are likely to be present in low or very low density, and a patchy distribution.

The artefact locale ***SU3/L1*** **(**GDA: 696852.6411952), is comprised of several stone artefacts found along c. five metres of a farm track (Plate 26). The artefacts included a chert flaked piece and retouched artefact, and quartz items including a core. The landform is a broad crest. The geology is shale and the soil is skeletal and very rocky. There is no potential for the site to contain subsurface archaeological deposit. It is, however, likely to be larger than recorded. The artefact locale is highly disturbed from road grading and vehicle traffic. The track is proposed to be used for Wind Farm access, and the artefact locale would, therefore be impacted.

Plate 26 Stone artefact scatter, SU3/L1; photo taken facing 160°.

A quartz outcrop in Survey Unit 18 (GDA: 692880.6411849) possesses evidence of having been struck by means of *hard hammer percussion* (Plates 27, 28 and 29). This locale, ***SU18/L1***, is defined for the purposes of this assessment as a possible Aboriginal stone procurement area (SPA); the status of this site cannot be determined by a visual assessment alone. While it appears unambiguous that the quartz outcrop has been struck by human agency, the actual identity of that agent is uncertain; there is some chance that prospectors may have struck the outcrop. To resolve this question, archaeological excavation would be required.

The quartz seam is exposed on a granite pavement on a broad crest landform. The pavement covers an area measuring approximately 30 – 30 square metres. The seam is oriented south-east – north-west. It measures c. 4m long, by 30 – 40 cm wide and c. 30 cm high above the ground. The quartz is reasonable quality (from the view point of a stone knapper) milky quartz.

The outcrop possesses extensive hertzian cone fractures and crushed and battered areas, but no obvious negative flake scars. A small amount of blocky quartz shatter is visible in the immediate vicinity of the seam, and one piece has evidence of secondary flaking with two negative flake scars. Thick moss covers the granite pavement around the seam; it is possible that further flaked debris is present in a subsurface context.

The locale is located within an area proposed to be used for wind farm access.

Plate 27 SU18/L1 looking 200°.

Plate 28 SU18/L1 - The quartz seam looking south-east.

Plate 29 SU18/L1 – close up of a section quartz seam showing numerous Hertzian cone fractures and *battered* areas.

Summary

The recorded artefact locale SU3/L1 is unlikely to represent the sum total of Aboriginal objects in the proposed activity area. The Effective Survey Coverage is assessed to be low and is a factor of high levels of grass cover encountered during the survey. Given the low ESC, the ability to detect Aboriginal objects on and in ground surfaces, was correspondingly low. Accordingly, the assessment of the archaeological status and sensitivity of the proposal area is necessarily dependent on the predictive model relating to Aboriginal landuse of the area, and the predicted nature of artefact density such occupation is likely to have produced.

All artefacts were recorded on crests (in one, possibly two locales) and no artefacts were recorded in simple slopes. However, given the very low ESC and the bias this presents to interpretation, it cannot be stated that artefacts would not be present on simple slopes. It is believed that the proposal area is likely to contain stone artefacts across the majority, if not all the Survey Units defined during this study. Accordingly, the one stone artefact locale which has been recorded is expected to be indicative of the archaeological status of the proposal area only, rather than a comprehensive inventory. However, any unrecorded stone artefacts, either in surveyed areas or in adjacent terrain, are predicted to be present in very low or low densities only.

The proposed impact areas are located in landforms and terrain which is highly amorphous and generally undifferentiated in character (the photos in the report illustrate this). During the field survey no landforms (or areas within landforms), were identified that are likely to have been environmental focal points that Aboriginal people would have habitually occupied and, hence, which would result in high density concentrations of artefacts. In addition, biodiversity is assessed to be relatively low, and water sources are ephemeral. Accordingly, Aboriginal use of this landscape is predicted to have been sparse, of low intensity, and restricted to a limited range of activities; - movement through country, hunting and gathering forays and so on. These types of activities would have resulted in artefact discard which is patchy and low density in distribution.

Accordingly, it is concluded that the proposed impacts to the archaeological resource can be considered to be of low significance. It is also relevant to take into consideration that impacts will be discrete in nature and will occupy a relatively small footprint. The archaeological resource in the broader development envelope (those areas which lie outside actual proposed impacts) will not sustain any impacts as a result of the proposal.

The Indigenous cultural value of the landscape in general, as well as the Aboriginal objects it contains, is considerably higher than the scientific value. Both the landscape and the objects which are encompassed within it, are material testament to the lives of Indigenous people's ancestors and the focus of their current identity, concerns and aspirations. Therefore, the proposed impacts will have an impact on the cultural significance which attaches to the area.

7.5 Survey Results – Non-Aboriginal

There is one previously identified historical item and one potential heritage item recorded during the survey within the broader Bodangora study area. These two recordings consist of a section of the Sandy Hollow to Maryvale Railway, and the area of the Kaiser Mine site (as discussed in Section 6).

The ***Kaiser Mine complex*** consists of a concrete ore treatment plant, the mine drive shaft, a mullock heap, and associated features and discarded items.

The surface opening of the mine drive shaft measures c. 20 x 10 metres and is roughly oval in shape. The opening immediately falls away to a depth of c. 15 metres with predominantly sheer sides. From this depth it angles into the earth for a distance of c. 245 metres (Rex England pers comm. 2011). Presently the shaft opening is substantially infilled with rubbish.

The ore treatment plant is of concrete construction erected over a substructure of steel reinforcement rods. It originally had a roof, which is now gone. The building measures c. 12 x 12 metres and is divided into seven cells. The treatment plant was constructed for the purpose of employing cyanide to leech gold from gold bearing ore (Rex England pers comm. 2011).

It should be noted that the area where the Kaiser Mine complex is situated is located entirely outside the area of proposed impacts.

Sections of the unfinished ***Sandy Hollow to Maryvale Railway*** are present within the study area. It is extant as excavations (cuttings) and build up sections. This feature is used as a farm road in the *Glen Oak* property.

Table 5 Survey coverage data.

SU	Length m	Width m	SU area sq m	Area Inspected %	Area Inspected sq m	Ground Exposure ave. %	Ground Exposure sq m	Visibility ave. %	Net Effective Exposure sq m	Effective Survey Coverage ave. %	Potential	Results
SU1	2398	100	239800	10	23980	10	2398	80	1918.4	0.8	low	nil
SU2	200	100	20000	15	3000	0	0	0	0	0	low	nil
SU3	804	100	80400	10	8040	10	804	80	643.2	0.8	low/moderate	SU3/L1
SU4	639	100	63900	15	9585	5	479.25	90	431.325	0.675	very low	nil
SU5	163	100	16300	15	2445	1	24.45	5	1.2225	0.0075	low	nil
SU6	172	100	17200	20	3440	0	0	0	0	0	low	nil
SU7	488	100	48800	15	7320	0	0	0	0	0	low	nil
SU8	188	100	18800	15	2820	0	0	0	0	0	low	nil
SU9	551	100	55100	10	5510	2	110.2	90	99.18	0.18	very low	nil
SU10	1160	100	116000	15	17400	1	174	90	156.6	0.135	low	nil
SU11	1012	100	101200	10	10120	1	101.2	90	91.08	0.09	very low	nil
SU12	1040	100	104000	10	10400	0	0	0	0	0	very low	nil
SU13	225	100	22500	20	4500	2	90	80	72	0.32	low	nil
SU14	2538	100	253800	10	25380	0	0	0	0	0	very low	nil
SU15	6275	100	627500	10	62750	2	1255	90	1129.5	0.18	low	nil
SU16	1000	100	100000	10	10000	10	1000	90	900	0.9	very low	nil
SU17	1854	100	185400	15	27810	5	1390.5	80	1112.4	0.6	low	nil
SU18	5409	100	540900	15	81135	1	811.35	50	405.675	0.075	low	SU18/L1
SU19	2354	100	235400	10	23540	0	0	0	0	0	low	nil
SU20	5149	20	102980	20	20596	20	4119.2	80	3295.36	3.2	low	nil
SU21	430	100	43000	15	6450	5	322.5	80	258	0.6	low	nil
SU22	334	100	33400	15	5010	0	0	0	0	0	low	nil
SU23	125	100	12500	0	0	0	0	0	0	0	low	nil
SU24	1137	20	22740	50	11370	10	1137	60	682.2	3	low	nil

SU	Length m	Width m	SU area sq m	Area Inspected %	Area Inspected sq m	Ground Exposure ave. %	Ground Exposure sq m	Visibility ave. %	Net Effective Exposure sq m	Effective Survey Coverage ave. %	Potential	Results
SU25	260	20	5200	25	1300	0	0	0	0	0	very low	nil
SU26	772	100	77200	15	11580	0	0	0	0	0	very low	nil
SU27	1093	20	21860	5	1093	10	109.3	80	87.44	0.4	very low	nil
SU28	1834	100	183400	15	27510	0	0	0	0	0	very low	nil
SU29	306	20	6120	10	612	5	30.6	80	24.48	0.4	very low	nil
SU30	1202	100	120200	15	18030	0	0	0	0	0	low	nil
SU31	2084	20	41680	1	416.8	50	208.4	80	166.72	0.4	very low	nil
total			3517280 c. 351.7 ha		443142.8 c. 44.3 ha		14564.95 c. 1.5 ha		11474.7825 c. 1.2 ha	0.3		

8. SIGNIFICANCE ASSESSMENT

The information provided in this report and the assessment of significance provides the basis for the proponent to make informed decisions regarding the management and degree of protection which should be undertaken in regard to the Aboriginal objects located within the study area.

8.1 Significance Assessment Criteria - Indigenous

The NPWS (1997) defines significance as relating to the meaning of sites: "meaning is to do with the values people put on things, places, sites, land". The following significance assessment criteria is derived from the relevant aspects of ICOMOS Burra Charter and NSW Department of Urban Affairs and Planning's 'State Heritage Inventory Evaluation Criteria and Management Guidelines'.

Aboriginal archaeological sites are assessed under the following categories of significance:

- cultural value to contemporary Aboriginal people,
- archaeological value,
- aesthetic value,
- representativeness, and
- educational value.

Aboriginal cultural significance
The Aboriginal community will value a place in accordance with a variety of factors including contemporary associations and beliefs and historical relationships. Most heritage evidence is highly valued by Aboriginal people given its symbolic embodiment and physical relationship with their ancestral past.

Archaeological value
The assessment of archaeological value involves determining the potential of a place to provide information which is of value in scientific analysis and the resolution of potential archaeological research questions. Relevant research topics may be defined and addressed within the academy, the context of cultural heritage management or Aboriginal communities. Increasingly, research issues are being constructed with reference to the broader landscape rather than focusing specifically on individual site locales. In order to assess scientific value sites are evaluated in terms of nature of the evidence, whether or not they contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a part of a larger site complex. Increasingly, a range of site types, including low density artefact distributions, are regarded to be just as important as high density sites for providing research opportunities.

Representativeness
Representative value is the degree to which a "class of sites are conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole" (NPWS 1997). Factors defined by NPWS (1997) for assessing sites in terms of representativeness include defining variability, knowing what is already conserved and considering the connectivity of sites.

Educational value
The educational value of cultural heritage is dependent on the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

Aesthetic value
Aesthetic value relates to aspects of sensory perception. This value is culturally contingent.

8.2 Significance Value of the Aboriginal Objects in the Study Area

The scientific significance of the recorded Aboriginal artefact locales in the project area are listed below in Table 6.

Table 6 Archaeological significance assessment of recorded Aboriginal object locales.

Locale	Predicted Density	Integrity	Subsurface potential at site	Subsurface potential away from site	Significance	Criteria
SU3/L 1	Low	Highly disturbed: vehicle track - eroding	No	No	Low local scientific significance	Common Aboriginal object and site type Low educational value Low aesthetic value Low research potential: predicted low artefact density in majority of Survey Unit
SU18/ L1	-	Undisturbed	Yes	Yes	Moderate local scientific significance	Reasonably rare Aboriginal object and site type Low educational value Low aesthetic value Moderate research potential

8.3 Significance Assessment Criteria – Non-Indigenous

The NSW Heritage Office and Planning NSW have defined a set of criteria and methodology for the assessment of cultural heritage significance for items and places, where these do not include Aboriginal heritage from the pre-contact period (NSW Heritage Office & DUAP 1996, NSW Heritage Office 2001, Heritage Council of NSW 2008).

The Heritage Council of NSW recognises the following four levels of significance for heritage in NSW:

- Local
- State
- National
- World

These four levels refer to the context in which a heritage item is important and does not refer to a ranking of significance. A heritage item may have significance at more than one level; items of local significance are by far the most common in New South Wales and make the greatest contribution to our living historic environment (Heritage Council of NSW 2008).

The following heritage assessment criteria are those set out for Listing on the State Heritage Register. In many cases items will be significant under only one or two criteria. The State Heritage Register was established under Part 3A of the Heritage Act (as amended in 1999) for listing of items of environmental heritage which are of state heritage significance. Environmental heritage means those places, buildings, works, relics, moveable objects, and precincts, of state or local heritage significance (section 4, Heritage Act 1977).

An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria:

Criterion (a) an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area) – known as *historic significance*;

Criterion (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area) – known as *historic associations*;

Criterion (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) – known as *aesthetic* or *technical significance*;

Criterion (d) an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons– known as *social significance*;

Criterion (e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area) – known as *research potential* or *educational significance*;

Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area) – known as *rarity*;

Criterion (g) an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments (or a class of the local areas) – known as *representative significance*.

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register. Only particularly complex items or places will be significant under all criteria.

In using these criteria it is important to assess the values first, then the local or State context in which they may be significant. In instances where a heritage item is complex and/or comprises numerous elements a hierarchy of significance may be useful in assigning significance to individual elements or areas of a site as different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases it is constructive to note the relative contribution of an item or its components. Table 7 below provides a guide to ascribing relative values for components of an individual item.

Table 7 Significance grading – Non-Indigenous heritage

Grading	Justification	Status
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness Item can be interpreted relatively easily.	Fulfils criteria for local or State listing.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from	Fulfils criteria for local or State listing.

Grading	Justification	Status
	significance.	
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

8.4 Significance Assessment – Non-Indigenous

The two heritage items recorded during this survey have been assessed against the State Heritage Register criteria and have been guided by the NSW Heritage Office update *Assessing Heritage Significance* (2001) and the Heritage Council of NSW update *Levels of Heritage Significance* (2008). A statement of significance for each item is provided below in Table 8; a brief description of the reasoning behind the significance assessment is included in the table. Further details regarding the heritage assessment are also discussed below in terms of the thresholds for each significance category and individual site details where appropriate.

Table 8 Significance assessment of potential Non-Indigenous heritage items.

Item	**Listing warranted**	**Statement of Significance**
Kaiser Mine	No	This item cannot be directly linked to people or events of historical importance; there is only very limited potential for the site to yield additional information and the site is not rare, representative of its type and does not display significant technological or aesthetic qualities.
Sandy Hollow to Maryvale Railway	n/a already listed	n/a

9. IMPACT ASSESSMENT, MITIGATION AND MANAGEMENT STRATEGIES

The aim of this study has been to identify Aboriginal areas, objects and places, and Non-Aboriginal heritage items, and to predict the archaeological potential within each Survey Unit, to assess site significance and thereafter, to consider the potential impact of the proposal upon this heritage.

In the following section a variety of strategies that can be considered for the mitigation and management of development impact to Aboriginal objects and Non-Aboriginal heritage items are listed and discussed.

9.1 Management and Mitigation Strategies – Aboriginal Objects

Further Investigation

The field survey has been focused on recording artefactual material present on visible ground surfaces. Further archaeological investigation would entail subsurface excavation undertaken as test pits for the purposes of identifying the presence of artefact bearing soil deposits and their nature, extent, integrity and significance.

Further archaeological investigation in the form of subsurface test excavation is necessary when it can be demonstrated that sub-surface Aboriginal objects with potential conservation values have a high probability of being present in an area, and when the area cannot be substantially avoided by a proposed activity (NSW DECCW 2010: 24).

No Survey Units have been identified in the proposal area to warrant further archaeological investigation. Based on a consideration of the predictive model of site type applicable to the environmental context in which impacts are proposed, sub-surface Aboriginal objects with potential conservation values are not predicted to have a high probability of being present.

The environmental contexts in which the turbines (and associated impacts) are proposed, contain eroded and disturbed soils as a result of moderate levels of environmental degradation. Soils across the proposed activity areas are either absent and skeletal (ie lithosols) or very shallow. They are not predicted to contain artefact density sufficient to warrant test excavation. Furthermore, proposed impacts are small-scale, discrete and primarily narrow, linear impacts. In addition, it is considered that in regard to the archaeology itself, subsurface testing is unlikely to produce results much different to predictions made in respect of the subsurface potential of these landforms. Accordingly, a program of subsurface testing undertaken within the impact assessment and planning phase of the project is not considered to be necessary or warranted.

Conservation

Conservation is a suitable management option in any situation, however, is not always feasible to achieve. Such a strategy is generally adopted in relation to sites which are assessed to be of high cultural and scientific significance, but can be adopted in relation to any site type.

When conservation is adopted as a management option it may be necessary to implement various strategies to ensure Aboriginal object locales are not inadvertently destroyed or disturbed during construction works or within the context of the life of the development project. Such procedures are essential when development works are to proceed within close proximity to identified sites.

In regard to SU18/L1 it is recommended that avoidance of impacts be undertaken by ensuring the proposed road avoids the site.

Mitigated Impacts

Mitigated impact usually takes the form of partial impacts only (i.e. conservation of part of an artefact locale or Survey Unit) and/or salvage in the form of further research and archaeological analysis prior to impacts. Such a management strategy is generally appropriate when Aboriginal objects are assessed to be of moderate or high significance to the scientific and/or Aboriginal community and when avoidance of impacts and hence full conservation is not feasible. Salvage can include the surface collection or subsurface excavation of Aboriginal objects and subsequent research and analysis.

Providing a strategy of impact avoidance /conservation is implemented in regard to SU18/L1, no Aboriginal objects warrant a strategy of impact mitigation in the form of salvage.

Unmitigated Impacts

Unmitigated impact to Aboriginal objects can be given consideration when they are assessed to be of low archaeological and cultural significance, and otherwise in situations where conservation or limiting the extent of impacts is simply not feasible.

SU3/L1 has been assessed to be of low archaeological significance. Given the nature of SU3/L1 unmitigated impacts are appropriate.

9.2 Management and Mitigation Strategies – Non-Aboriginal

Two Non-Aboriginal heritage items occur either within or in close proximity to the proposed activity area.

The Kaiser Mine is located near to, but outside the area of proposed impacts associated with WTG 44. However, it is recommended that the mine site should be highlighted as a no-go area during wind farm construction, so as to ensure the items associated with the site are not inadvertently impacted.

The Sandy Hollow to Maryvale Railway Line is currently in use as a road. The proponent intends to use the same road for access during construction and the use-life of the proposed wind farm. Impacts which are additional to those which the railway line/road already sustains, are not proposed. Nevertheless a Statement of Heritage Impact has been completed for the item and is attached as Appendix 1.

10. RECOMMENDATIONS

The following recommendations are made on the basis of:

- A consideration of the Part 3A amendment to the Environmental Planning and Assessment Act.

- The results of the investigation as documented in this report.

- Consideration of the type of development proposed and the nature of proposed impacts.

Management and mitigation strategies are outlined and justified in Section 9 of this report. The following recommendations are provided in summary form:

1. Management and mitigation recommendations are listed in respect of each Aboriginal object locale and Non-Aboriginal heritage item in Section 9 of this report.

2. No Survey Units or artefact locales have been identified in the proposal area to warrant further archaeological investigation such as subsurface test excavation.

3. None of the Survey Units, Aboriginal object locales or Non-Aboriginal heritage items in the proposal area has been assessed to surpass archaeological significance thresholds which would act to preclude proposed impacts.

4. It is recommended that ground disturbance impacts associated with the proposal be kept to a minimum and to defined areas so as to ensure as little impact as possible to the Aboriginal objects (stone artefacts) which can be expected to extend in a relatively continuous distribution across the broader landscape encompassed by the proposal.

5. It is recommended that additional archaeological assessment is conducted in any areas which are proposed for impacts that have not been surveyed during the current assessment. It is predicted that significant Aboriginal objects can occur anywhere in the landscape and, accordingly, if present they need to be identified and impact mitigation strategies implemented, prior to impacts.

6. The proponent should, in consultation with an archaeologist, develop a Cultural Heritage Management Protocol, which documents the procedures to be followed for impact avoidance or mitigation. The development of an appropriate Cultural Heritage Management Protocol should be undertaken in consultation with an archaeologist, the relevant Aboriginal communities and the NSW Office and Environment and Heritage.

7. Personnel involved in the construction and management phases of the project should be trained in procedures to implement recommendations relating to cultural heritage where necessary.

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APPENDIX 1

Statement of Heritage Impact for a short section of the Maryvale to Sandy Hollow Railway line.
Date: 12th September 2011 **Reference:** Wellington Shire Council Local Environment Plan 1995 (Rural) - Heritage Schedule: *Maryvale to Sandy Hollow Line*
This statement forms part of the Environmental Assessment for the proposed Bodangora Wind Farm project area. The proposed impact area is situated north-east of Wellington, NSW.

The proposal is to install up to 40 wind turbines and associated infrastructure, including an on-site underground electrical cable network, overhead powerline, and substation. The Maryvale to Sandy Hollow Railway Line is currently used as a farm road on the property of *Glen Oak* on which a number of turbines are proposed. Bodangora Wind Farm Pty Ltd proposes to use the road for access into and through the property, for construction and the on-going operation of the project.

Address and property description:
'Glen Oak', via Wellington. The property is a sheep and cattle grazing farm.

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Bodangora Wind Farm Pty Ltd

Why is the new development required to cause impact to a heritage item?
The heritage item in question is currently used as a farm road in that section of the *Glen Oak* property through which it traverses.
Bodangora Wind Farm Pty Ltd requires access into *Glen Oak* for the installation of wind turbines on that property and proposes to use the existing farm road. The road would be used on an on-going basis for the operation of the wind farm. The railway line is the only extant road access into and through *Glen Oak*, and it is for this reason that it is required to be used.

Discussion of how the proposal respects or enhances the heritage significance of the item; which aspects of the proposal could detrimentally impact on heritage significance; measures taken to mitigate impacts and where appropriate, reasons why other sympathetic solutions have been considered and discounted:
As discussed in the body of this report, it is unlikely that the Railway line would require to be modified for use during the wind farm construction and operation. Accordingly, impacts can be considered to be negligible. This would be ensured through the identification of the heritage item to the proponent and their contractors along with advice on implementation of practical harm minimisation strategies, as documented in a Cultural Heritage Management Plan.
An alternative strategy would be to construct a new road for access into, and through, the *Glen Oak* property. However, this is discounted as it would be environmentally unacceptable. Furthermore, the inconvenience to the land owner, of an additional road requiring maintenance, is considered to be unwarranted.

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