

**FLAT ROCKS WIND FARM  
LANDSCAPE AND VISUAL ASSESSMENT**



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**WILLIAM JAMES LANDSCAPE ARCHITECTS**

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# 1. INTRODUCTION

## 1.1 Study Background

This document is a Landscape and Visual Assessment of a proposed wind farm at Kojonup in Western Australia. The proposed wind farm is on private farm land approximately 20km south east of Kojonup, 27km north west of Tambellup, 16 km west of Broomehill and 27km south west of Katanning in the Great Southern region of Western Australia. The development is spread over six farming properties. The total area of the development envelope is 6,480ha of which approximately 30ha will be directly affected. The proposed site is shown in Figure 1. The wind farm layout is shown in Figure 2.

The proposal is for a 74-turbine wind farm. Each turbine generates 2mW of electricity. The towers to the top of the turbines are 84m high and the blades have a diameter of 112m, giving an overall height of 140m. The operating life of the wind farm is 20 years, after which, subject to further planning approval, it will be refurbished and continue operating, or be decommissioned and removed.

The proponent of the wind farm is a local consortium, Moonies Hill Energy Pty Ltd.

The Landscape and Visual Assessment advises the proponents of the landscape and visual impacts of the proposal and will assist them to minimise those impacts. The Assessment is required as part of the Development Application process.

A Panel set up to review submissions on the Bald Hills Wind Farm in Victoria (Bald Hills, 2004) adopted the following principles to measure the performance of the wind farm in terms of landscape values:

- To ensure that any proposed development is sensitively sited and designed so as to have minimal impact on the significant landscape values of the surrounding land.
- To ensure that areas of natural scenic beauty and importance are conserved and maintained.

This assessment aims to achieve the same measure of performance.

The Assessment includes:

- a summary of the landscape values of the area;
- objectives and standards that apply to the management of landscape values in the area;
- an assessment of the visibility and appearance of the wind farm and the impact that will have on the landscape values of the area;

- an evaluation of the development based on the assessed impact and its compliance with the objectives and standards; and
- recommendations, including modifications, that will help minimise impacts on values and achieve better compliance.

The assessment is carried out at two levels – the regional level and the neighbour level.

## 1.2 Study Area Description

The study area lies within a triangle formed by the roads linking Kojonup, Broomehill and Tambellup in the Great Southern region of Western Australia. The largest close town is Kojonup with a population of approximately 2200 people.<sup>1</sup> The economy of the area is based on rural industries, principally wheat and sheep. The Kojonup area has been a prime farming location since its settlement in the 1840's. It has fertile soils and has historically enjoyed reliable annual rainfall. Kojonup's historical origins stem from its location on the major coach route joining the early settlements of Albany and Swan River.

The landscape is undulating farmland with scattered remnant Eucalypt and Sheoak woodland with isolated trees in paddocks. The landscape has been approximately 85% cleared since settlement. The common trees are Wandoo, Marri, Jarrah and Sheoak. Marri and Jarrah grow to heights in excess of 30m while Sheoak grows to about 6-8m. Extensive areas of intact natural vegetation are uncommon<sup>2</sup>. It is likely that the individual Eucalypts in paddocks will decline and disappear over time and that shelterbelts and other plantings will become more prominent. Individual landholdings average about 1800ha. Minor gravel public roads dissect the area of the wind farm.

The site lies within the Dryandra Uplands of the Wheatbelt Plateau as described in "Reading the Remote – Landscape Character Types of Western Australia", published by the Department of Conservation in 1994. The Dryandra Uplands extend easterly from the forests of the Darling Scarp to the division, which marks the westerly limit of the wide shallow valleys of the Merredin Plateau sub-type. The Kojonup area is a transition zone between the tall forests of the west and low woodlands of the east.

There are seasonal creeks within the study area but no extensive natural water bodies. Runoff is captured in constructed farm dams. These are built for utility and are square or rectangular in shape.

The most common means of movement through and around the area is by motor vehicles – family cars, farm utilities, school buses and four-wheel drives. Tourist coaches travel along the Albany Highway and

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<sup>1</sup> 2009 figures

<sup>2</sup> There are few areas of natural vegetation over 150ha. The largest is 230ha.

the Great Southern Highway. There are no formal cycle paths or walking trails. When driving through the landscape the views open and close regularly with the absence and presence of roadside vegetation. From elevated locations, where vegetation is absent or sparse, the views are panoramic and long, but generally the views are shortened and narrowed by landform and by vegetation, both in the road verge and in adjacent paddocks.

The landscape values of the area are dealt with in detail later in this study.

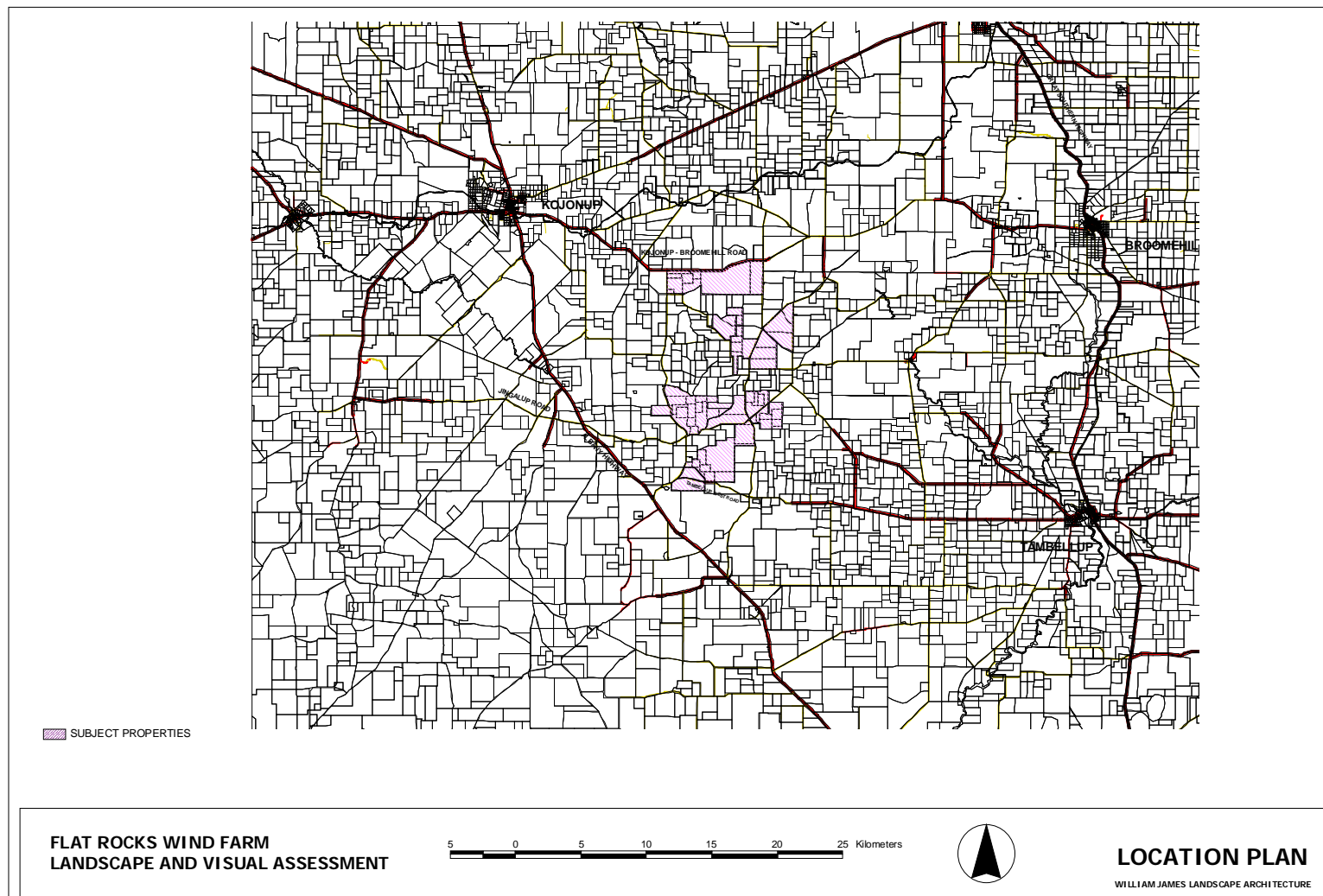


Figure 1: Location Plan



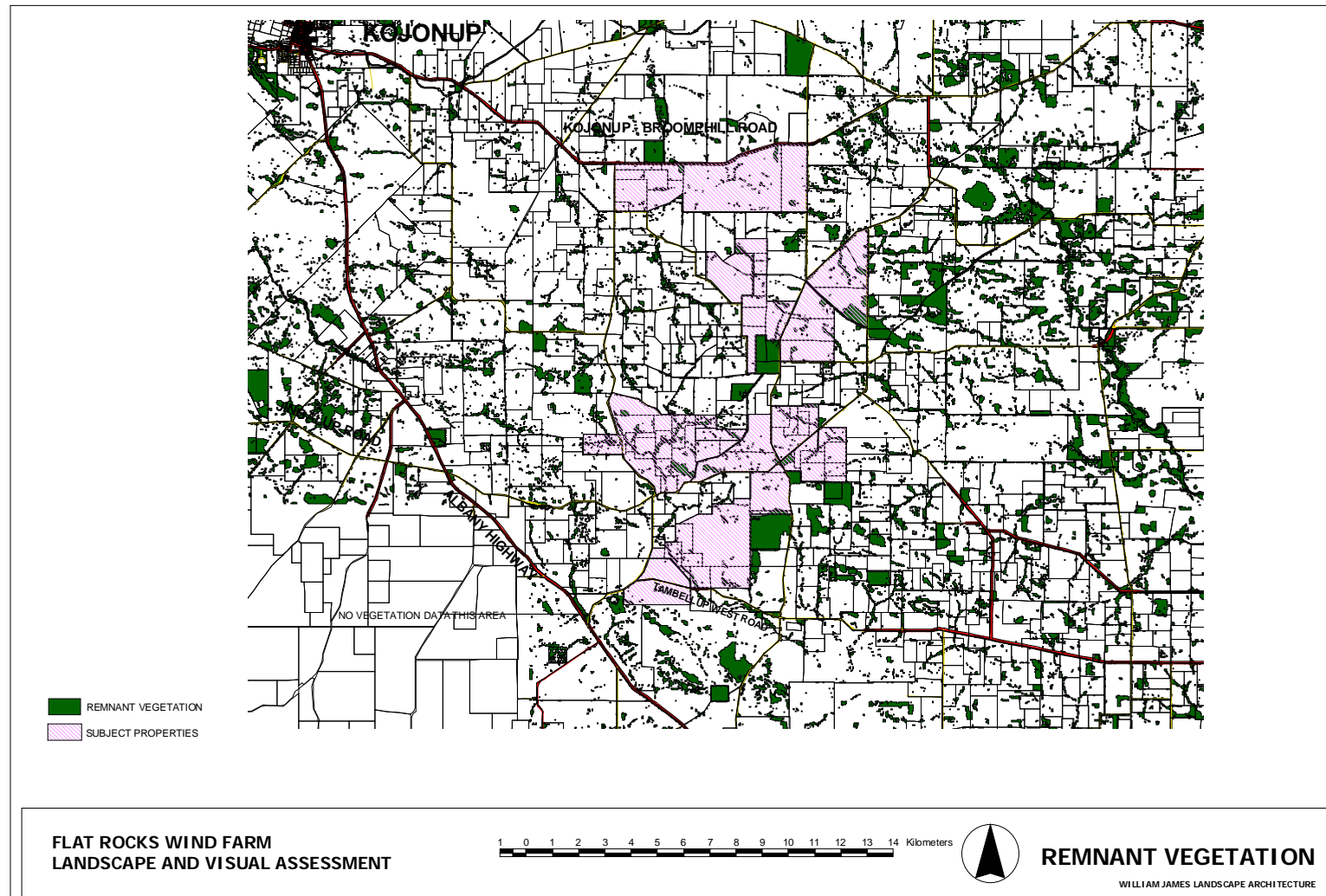


Figure 2: Remnant Vegetation

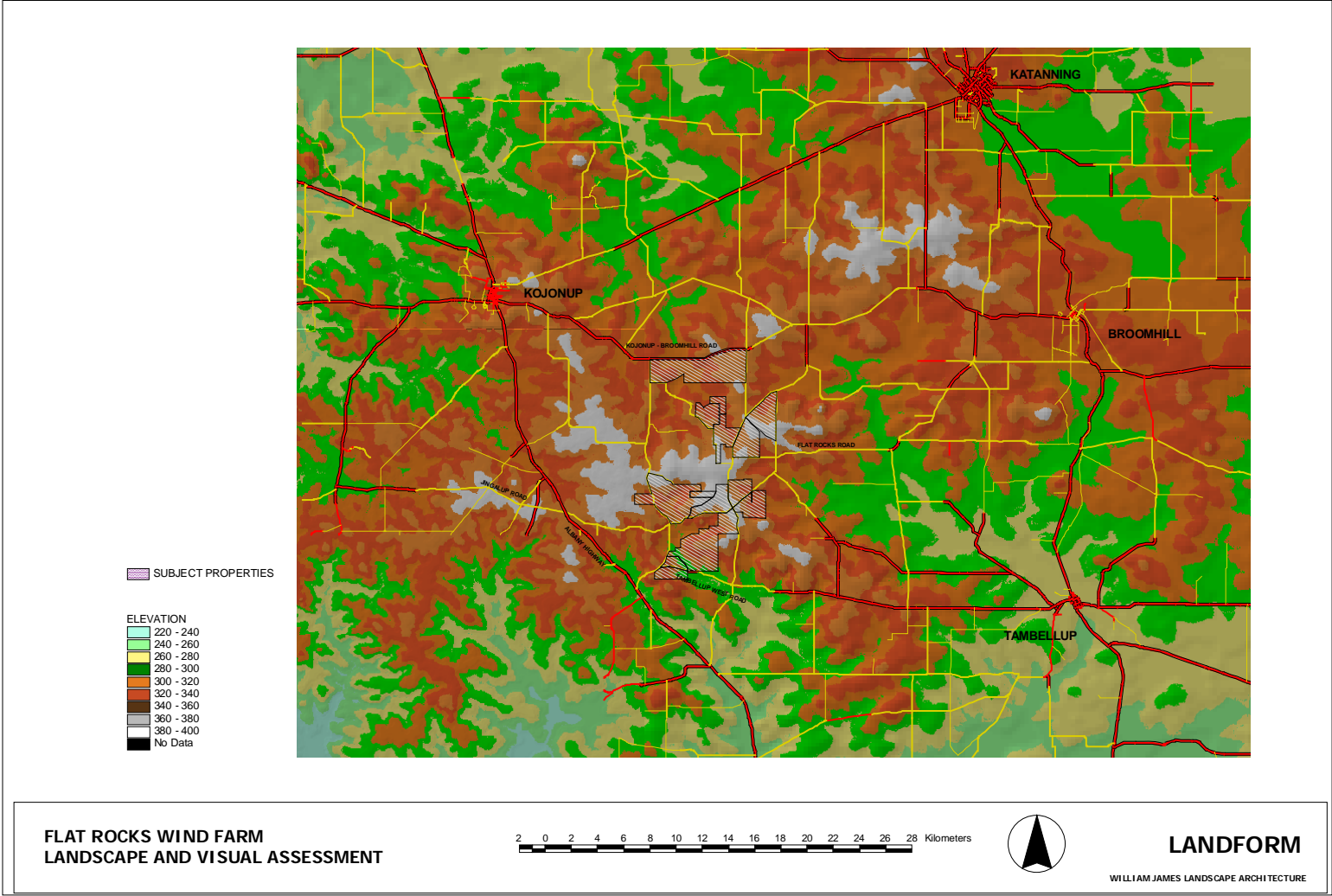


Figure 3: Landform

### 1.3 Relevant Landscape Studies and Reports

#### **Western Australian Planning Commission Planning Bulletin 67 – Guidelines for Wind Farm Development - 2004**

This document discusses Landscape and Visual Impact under the heading "Environmental Issues". It outlines factors affecting the visual impact of wind farms and discusses methods of ameliorating these impacts. The purpose of the Bulletin is "to provide local government, other relevant authorities and wind farm developers with a guide to the planning framework for the balanced assessment of land-based wind farm developments, throughout the state of Western Australia".

#### **Western Australian Planning Commission – Visual Landscape Planning in Western Australia – 2007.**

Sub-titled a "Manual for evaluation, assessment, siting and design", this document sets out guidelines and techniques for incorporating landscape assessments into planning and design throughout Western Australia. Wind farms are discussed in some detail.

#### **The Australian Wind Energy Association and the Australian Council of National Trusts have produced a number of detailed reports under the main title "Wind Farms and Landscape Values"**

The reports result from wide consultation and extensive research into managing the impacts of wind farms on landscape values in Australia. The final report in the series sets out in detail the steps that should be undertaken in preparing a comprehensive landscape assessment for a wind farm.

#### **The Shire of Kojonup Town Planning Scheme No. 3, the Shire of Broomehill/Tambellup Town Planning Scheme No. 1**

The Town Planning Schemes identify use zones and permitted uses and policies for those areas and for the Shire in general.

#### **Heritage Lists**

These lists identify sites and areas of cultural and historical heritage value that have been registered with a local, state or federal government agency.

## 1.4 The Scope the Study

This Landscape and Visual Assessment considers the proposed wind farm in terms of its impacts on the regional landscape and on neighbours.

The proponents of the wind farm, Moonies Hill Energy Pty Ltd, provided a preliminary layout for assessment. This preliminary layout is assessed for visual impacts and subsequent impacts on values. Modifications are recommended.

## 1.5 The Study Method

The study is based on a method developed by John Cleary Planning (Cleary et al, 2005) The author of the current study has used the method in numerous landscape and visual assessments throughout Western Australia.

Landscape Assessment sets out to answer six straightforward questions:

- What is there?
- How valuable is it?
- What is proposed?
- What are the impacts of the proposal?
- Are these impacts acceptable?
- If not, what strategies can be implemented to reduce the impacts to an acceptable level?

The method used in this assessment considers these questions under the following general headings and topics:

### **Assessment of values**

- General characteristics of the area as they affect human experience.
- The characteristics that people most value.
- Use of the area and experience of the landscape.

### **Planning framework**

- The planning policies and statements that control and guide the development.

### **Management aims and objectives**

- Management aims, objectives and standards that best represent the planning framework and values.

### **Impact assessment**

- Physical components of the development and consequent changes to the area.
- Areas visually affected by the development and the visibility and appearance of the development from these areas.

- The impact of the development on existing landscape values.
- Effect on recreation and tourism values.
- Cumulative effect.
- Effect on neighbours.

**Evaluation**

- Given the impact of the proposal on landscape values, will management objectives be met?
- Current community attitudes to this type of development.

**Recommendations, design modifications and guidelines**

- Planning and design principles to minimise the impact of the proposed development.
- Strategies to achieve higher levels of compliance with objectives.
- Minimising the effect on neighbours.

**Conclusion**

- Final evaluation of the proposal after implementing the strategies to minimise impacts.

## 2. LANDSCAPE VALUES

The assessment of the landscape values of the study area considers community perceptions and values and the aesthetic attributes of the physical environment.

Community perceptions and values can be identified in surveys, workshops or interviews with inhabitants and visitors to a specific area, and through a general understanding of people's perceptions of landscape.

An assessment of the aesthetic attributes within the study area focuses on natural features and rural use areas. Aesthetic significance is particularly important. Aesthetic significance is based largely on visual characteristics but other sensory characteristics are also considered: for example, social, cultural, historical and scientific aspects of places.

The main factors affecting aesthetic value in this assessment are landscape character, landscape significance, wilderness quality, views and access. People commonly identify these factors in discussions, workshops and submissions, and when responding to development proposals.

## 2.1 Community Perceptions and Values

In this study, local community attitudes to landscape values are extrapolated from general sources as there is no formally published local work on the subject, and, at the stage of this assessment, there had been no formal consultation with the local community regarding landscape values.

There is a large body of existing research relating to landscape values that allows assumptions to be made about aesthetic values (Fabos and McGregor 1979, Ribe 1989, Zube et al 1974.) The research outlined in these studies deals principally with visual aesthetic characteristics of the landscape. Other, non-visual, aspects of landscape play an important part in people's experience of landscape and while these aspects are recognised it is the visual aspects that are given the most emphasis – partly because these other aspects are more personal and less obvious, and partly due to legislative and policy requirements.

Research into perceptions of landscape significance (Anderson et al 1976, Zube et al 1974, Williamson and Chalmers 1982) finds that landscape significance increases with:

- increased topographic ruggedness,
- increased naturalism,
- increased land use compatibility,
- increased presence of water forms and extent of water area and edge, and
- increased presence of outstanding natural features.

Other studies suggest that landscape significance increases with:

- increased legibility of features,
- increased spatial definition,
- increased sympathy in land use response to natural features,
- increased pattern and texture in rural areas.

In the absence of data about specific local community values these general perceptions are used as an indication of community attitudes regarding landscape significance.

## 2.1 Landscape Character Classification and Description

The landscape of the study area is undulating farmland, largely cleared of the natural vegetation. In rural landscapes the character is largely dependent on past land use. The natural landscape may only be fully represented in isolated patches and is partially represented over the remaining landscape by the landform, major topographic features and remnant trees.

Landscape character is described at two scales - regional and local.

### 2.1.3 Regional Landscape

The regional landscape is classified in Reading the Remote - Landscape Characters of Western Australia (DEC, 1994) as the Dryandra Uplands Landscape Character Sub Type of the Wheatbelt Plateau".

This Sub Type extends east from the green forests, which cloak the Darling Plateau Character Type to the division, which marks the westerly limit of the wide shallow valleys of the Merredin Plateau Sub Type. This area is an agricultural landscape featuring extensive open bleached blonde paddocks, occasionally punctuated by dams and windmills, with long views across the undulating terrain.

The valley systems in this Sub Type have dissected the terrain more distinctly than those further east, and the headwaters of many westward flowing watercourses originate here including the Williams-Murray system. The extensive catchment areas of the Avon and Blackwood Rivers have a widespread influence over the topography and the eastern margin of the Sub Type marks the limit of their constant westward flow.

Cereal crops and pasture dominate the vegetation of the Dryandra Uplands, which have pushed the native remnants to the periphery of their extent. Patches are common along fence lines, enclosing and shading roads as well as marking the meandering watercourses dissecting the gently undulating landscape. York Gums (*Eucalyptus loxophleba*) regularly feature along the drainage lines and roadsides and as scattered clumps in cleared fields. This straggly tree with rough grey bark is often seen with the low Bushy Jam Tree (*Acacia acuminata*) which dominates in shrubby remnant vegetation patches where the taller trees are not prevalent. The pale silver grey or the mottled creamy yellow of Wandoo (*Eucalyptus wandoo*) are also seen along the roadside as part of the mixed low woodland and as isolated shade trees in cleared fields. Larger areas of remnant vegetation often coincide with outcroppings of granite. They appear as tumbled piles of lichen encrusted boulders, as horizontal sheets of rock peppered with low tenacious plants such as Pincushions (*Borya sphaerocephala*), and as large domes which dominate the surrounding landscape.

Low pale terracotta coloured hills of lateritic gravel are scattered over the terrain appearing as isolated islands surrounded by crops and pastoral land. These eroding hills are bound by small escarpments known as breakaways. These exposed, pale clay slopes are made more apparent by the patchy remnant vegetation decorating their slopes, often consisting of Powderbark Wandoo (*Eucalyptus accedens*) and Brown Mallet (*E. astringens*).

The Dryandra State Forest (now National Park) is a distinctive

highlight of this Sub Type as it is a reminder and impression of the part of the natural landscape which existed before the extensive clearing for farming was undertaken. This large area features a remnant Wandoo and Powderbark Wandoo woodland which is quite distinct from the expanse of agricultural land that surrounds it. The strong line created by the smooth mottled creamy yellow bark of these trees contrasts with the grey green of the sparse low herbaceous undergrowth and patches of the soft Sheoak and prickly Dryandra thicket. Dense areas of young Wandoo trees with the thin brown and silver grey whippy trunks occur in patches, with the glossy leaved Brown Mallet, which has also been established in plantations, seen scattered amongst the old Wandoo.

The major river systems, such as the U-shaped Hotham River valley, were the first areas to be cleared by early settlers for agriculture. Extensive areas of pastoral land dissected by stock fences, dotted with numerous flocks of sheep and occasionally cattle, intermingled with broad fields of cereal crops.

The visual attributes of the long, low grey-white storage silos and the occasional abandoned farmhouses built of local materials, are as much a part of this altered landscape as natural features. Farming communities and towns form a major part of the cultural character of this landscape, featuring many well known historic sites and associated features. Farming communities and towns form a major part of the cultural character of this landscape, featuring many well known historic sites and associated structures. Two of these historic sites are the Spanish Style Benedictine Monastery and community at New Norcia, and the Aboriginal settlement at Moore River near Mogumber, which were originally established to look after Aboriginal people of the south-west who were displaced by European settlement.

Northam is the largest population centre of the area, closely followed by Narrogin, and smaller communities include York, Kojonup, Toodyay and Brookton.

#### 2.1.4 Local Landscape

The landscape in the vicinity of the proposed wind farm is gently undulating farmland with scattered patches of native vegetation and remnant Eucalypts and Sheoaks in paddocks and roadsides. The land is approximately 85% cleared. The land grades generally at 0-5% with occasional 5-10% slopes. Flats are virtually absent, both on hilltops or valley floors. Shallow creek-lines lie in broad shallow valleys with the land draining generally towards the south.

The general location of the wind farm is elevated above the surrounding landscape. These uplands take in Katanning, Kojonup and Broomehill and run out towards Tambellup. This upland ranges in



altitude from 300m to 400m, rising out of terrain of elevation 220m to 300m.

The remnant trees in paddocks and roadsides are Wandoo (*Eucalyptus wandoo*), Jarrah (*E. marginata*), Marri (*Corymbia calophylla*) growing to around 30m, Brown Mallet (*E. astringens*) growing to 20m and (*Allocasuarina heugeliana*), growing to about 6-8m. There are scattered patches of open Eucalyptus woodland; in wet locations the Flooded Gum (*E. rudis*) occurs with Jam Tree (*Acacia acuminata*) and Paperbarks (*Melaleuca raphiophylla* and *M. cuticularis*) while in drier locations the mallee *E. loxophleba* may occur.

The major geological feature is the Kojonup Fault which runs through Kojonup from Dwellingup to the Stirling Ranges. It forms a transition between two major drainage zones - one to the east that drains the flatter areas of the wheat belt and one to the west draining the steeper country of the Jarrah forest. The Kojonup Sandstones contain plant fossils. The area is bisected to the north by the Beaufort Palaeochannel - a 100 million year old trench full of sediments, some containing *Nothofagus* (Arctic Beech) pollens from when the area was under rainforest some 40 million years ago<sup>3</sup>.

Kojonup is an ecotone, a divider between two ecosystems. Ecotones are scientifically important as they are areas where components of two distinct ecosystems mix together, for example it is the only place where Baudin's and Carnaby's White-Tailed Cockatoos; and Red-Tailed Cockatoos are all found together<sup>4</sup>. The Kojonup area is biologically important because it a transition zone between high and low rainfall areas - represented in the landscape as a change from forest to woodland with a consequent increase in vegetation types and species.

Up until European settlement in the 1840's the land had been subject to Aboriginal land husbandry for tens of thousands of years. Landscape change during this time was very gradual. With European settlement the pace of change increased. In 1837 there was a marked road through what is now the town of Kojonup and a military outstation at Kojonup Spring. At this time Kojonup was a "parklike open landscape with scattered Eucalypts"<sup>5</sup>. The military post was abandoned in 1838 and in 1840 came the first public sale of locations in the Kojonup district. The red loam soils were sought after and there was early enthusiasm for land acquisition, much of it speculation, fuelled by high wool prices in the eastern states. A crash in the wool price in the 1840's, however, soon brought speculation to an end. In 1840 the road from Albany to Perth was improved and another military post built, but in a different location to the Spring. In 1842 there were five soldiers stationed

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<sup>3</sup> Dr Richard George, Hydrologist, from notes at Kodja Place.

<sup>4</sup> Dr Dennis Saunders, Ornithologist and Ecologist, from notes at Kodja Place.

<sup>5</sup> From "First the Spring. A History of the Shire of Kojonup, Western Australia" by Merle Bignell

at Kojonup. In 1843 stone buildings replaced the original timber barracks.

Sandalwood cutting was among the first European land uses to make any real impression on the landscape. This was soon followed by grazing on "selections". "The art of making a selection consisted of picking out a good block of 160 acres with land around it sufficiently good for a back run but not so good as to tempt purchasers. The usual procedure was to purchase 160 acres near a reliable water-point as that entitled the purchaser to the use of unsold Crown land for ten miles around"<sup>6</sup>. By the 1860's there were numerous small holdings around Kojonup with wheat crops, sheep, cattle and pigs. Photographs from the early 1900's show quite extensive clearing, with dead ring-barked trees silhouetted against the skyline. The landscape was changing. Today the landscape is quite open. About 90% of the study area has been cleared since European settlement, with remnant Eucalypts remaining in the grazing paddocks. The wheat fields have been almost completely cleared of trees.

Typical landholdings today average approximately 1800ha. Homesteads are sometimes quite visible from the roads, particularly from the minor gravel roads but not so commonly from the major highways. These homesteads are commonly accompanied by large sheds, yards and ornamental tree planting and gardens. Driveways to the homesteads are often lined with trees - both native and exotic trees are used. Homesteads are often signified by plantings of conifers, palms and deciduous trees.

Views from the roads open and close with changes in landform and vegetation. There are extensive views from elevated locations where there is little foreground vegetation but, mostly, the views are filtered through roadside vegetation and through scattered trees within the paddocks. The landform is gently and uniformly undulating - there are no extensive flat areas and no obvious high features in the landscape. The drainage lines and hilltops have retained more vegetation than the midslopes. From high vantage points the drainage lines can be made out by the ribbons of vegetation running through the landscape.

The landscape changes markedly with the seasons. In early summer the dominant feature is the geometry of the newly harvested golden straw-coloured wheat fields, in autumn and winter it is the bright green of the newly germinated pasture and crops. New growth on the remnant trees and other vegetation is also a feature of autumn. Yellow canola flowers colour the landscape in patches in the spring - at the same time the wheat crops begin to head. Flowering in the remnant bushland and trees occurs all year round but is most obvious in late winter and spring.

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<sup>6</sup> Ibid



A patch of retained vegetation



View confined by roadside vegetation (predominantly Sheoaks)





View from road filtered by trees



Open view across paddocks with scattered remnant Eucalypts





Plaque to commemorate the site of Marleyup State School site 1906 – 1947



Homestead visible from the road

## 2.2 Landscape Significance

Significance in the landscape attaches to those areas and features that have special aesthetic, social, cultural, ecological, historical or scientific value. Significant areas and features are the most valuable elements of the landscape and require particular protection. Loss of or alteration to these areas and features has the most potential to degrade landscape values.

Aesthetic significance arises from a variety of factors and combinations of factors. The DEC publication "Reading the Remote" provides "Frames of Reference" for "Visual Quality Classification". These Frames of Reference, reproduced below, are a useful guide to landscape significance within the study area.

Dryandra Uplands Sub Type Visual Quality Classification – Frame of Reference			
SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM
HIGH	<p>Isolated peaks or hills with distinctive form that become focal points eg. Wongan Hills.</p> <p>Rock outcrops or jumbles of large boulders eg. Boyagin Rock.</p> <p>Distinctive U-shaped valleys eg. Hothman River Valley.</p>	<p>Strongly defined patterns of vegetation of some diversity of species, colour, height and density.</p> <p>Vegetation which shows distinct form, line colour and texture contrasts with the surrounding landscape eg. Wandoo at Dryandra National Park.</p>	<p>Rivers and streams of permanent nature eg. Blackwood River at Boyup Brook.</p> <p>Wetlands, swamps and lakes eg. Lake Ninan</p>
MODERATE	<p>Undulating country which is not visually dominant but is surrounded by similar landforms.</p> <p>Broad shallow valleys.</p>	<p>Vegetative patterns evident but with little diversity.</p> <p>Moderate contrasts with surrounding landscape.</p>	Intermittent streams.
LOW	Large expanses of indistinctly dissected landform that provide few landmarks by which to orient.	Extensive areas of similar vegetation such as grassland with very limited variation in texture and colour.	Waterforms absent.

Figure 4: Visual Quality Classification from "Reading the Remote"

The elements that would lend aesthetic significance to the landscape in the region of the wind farm project are:

**Landform:**

- Highpoints and hill tops that stand distinctly above the general undulations in the landscape, particularly with extensive vegetation cover
- Distinct drainage lines cutting through the landscape
- Rock outcrops
- Slopes greater than 10%

**Vegetation:**

- Relatively large areas of intact native vegetation
- Groves of tall Eucalypts of uniform height
- Extensive rows of tall Eucalypts on roadsides or fence-lines
- Densely vegetated stream-lines
- Distinctive individual remnant trees
- Vegetation communities exhibiting distinct seasonal change
- Vegetation communities with a high incidence of seasonal wildflowers

**Rural Land Use:**

- Areas where native vegetation creates a sense of spatial enclosure
- Edges of remnant vegetation that enclose spatial areas
- Homesteads and associated buildings and gardens of impressive scale
- Homesteads and rural buildings (particularly woolsheds) of distinctive architectural style
- Homesteads and rural buildings that demonstrate a sympathetic relationship to the natural topography and/or vegetation
- Large dams with organic form and edging vegetation
- Sites and areas of cultural and/or social significance



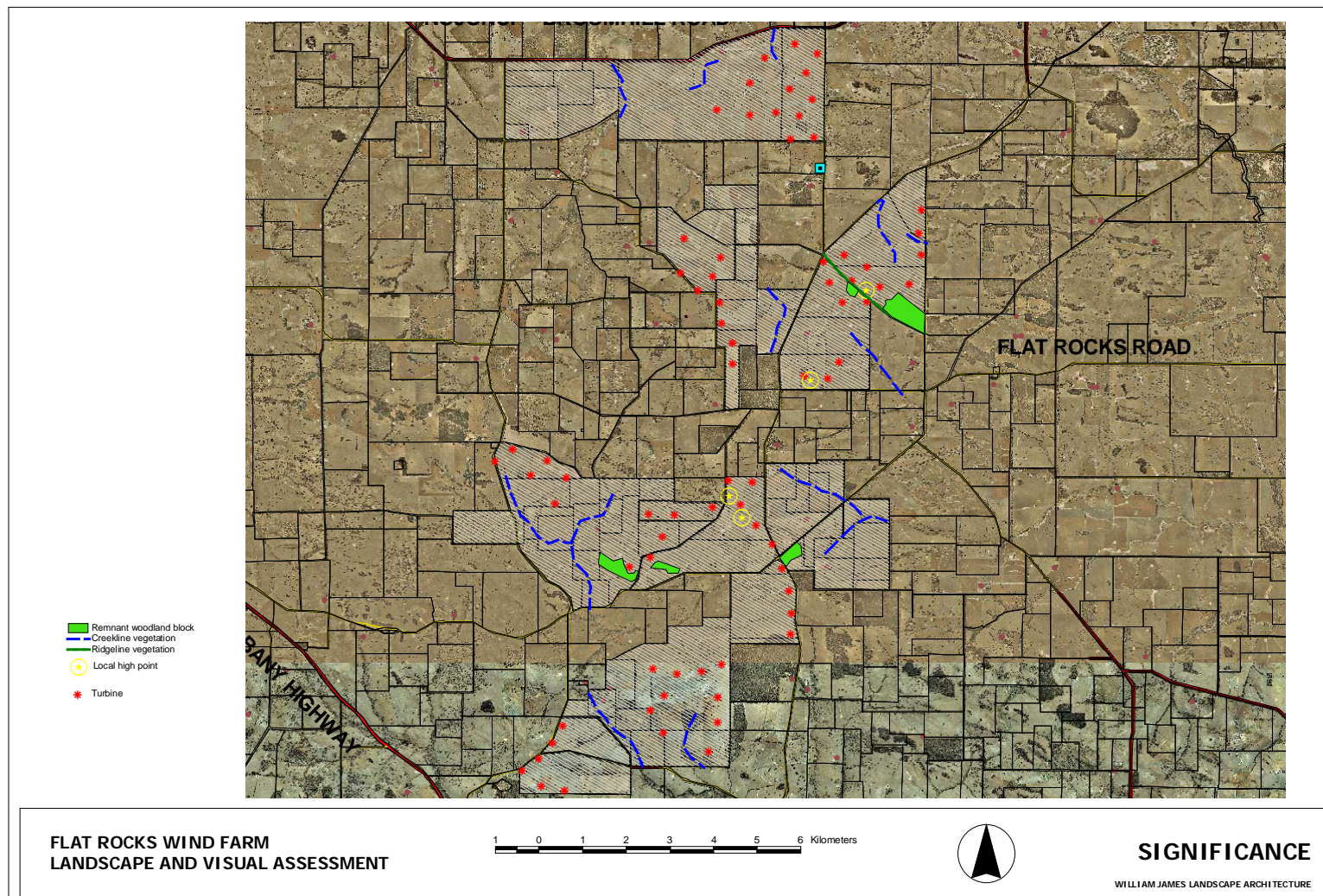


Figure 5: Significance



## 2.3 Views

Views offer the opportunity to experience the landscape, often beyond the immediate area of interest. While a wind farm is a visually transparent structure taken as a whole, each turbine, or group of turbines, will have an impact on existing views. The extent of this impact will depend on the location of the viewer in relation to the turbines and the object of the view. Generally, the closer the turbine is to the viewer, the greater will be the impact on views. In most cases the turbines within a view will not close off the view but will rather be seen as elements within the view. This will have different effects on different people. Wind farms tend to evoke strong opinions. You commonly hear the expression "some people love them, some hate them". Many, of course, have no strong feelings either way but we tend to hear the strong opinions, both for and against. When assessing the visual impacts of a wind farm it is not particularly useful to try to incorporate these strong opinions into the process when considering public viewing locations but it is important to incorporate them when considering private viewing locations.

In the case of the Flat Rocks Wind Farm views to the distant Stirling Ranges are particularly important. This view, although not available from many locations, is particularly valued by neighbours of the wind farm at Kojonup Location 8786. This private view will be considered, among others, in the impact assessment phase of this study.

### **Key Views**

Keys views are those that have particular significance because they:

- focus on a significant landscape feature
- are at a location or a stretch of road where particularly long, wide or attractive views are available<sup>7</sup>
- are at a location of particular cultural or social significance

## 2.4 Access

Access to a place, generally for recreation, is one of the ways in which the landscape is experienced and enjoyed. Public access is, therefore, a major factor in determining the values of a particular landscape. The Flat Rocks Wind Farm will be on private land that is currently not available for public access. The land in which the wind farm will be developed will remain private land under agricultural uses and will continue to be unavailable for public access and use.

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<sup>7</sup> These are the key views in the current study. There are keys views on Albany Highway, Kojonup Broomehill Road and Tambellup West Road – identified as 1, 8 and 4 respectively on Figure 8.

## 2.5 Wilderness quality

Wilderness quality considers perceptions of wilderness rather than the strict definition of wilderness. Areas of high wilderness quality represent the environment in its natural state, provide a resource bank that may provide the backdrop and sense of remoteness for other more used areas.

The extent of clearing in the study area results in an area combined with the rural land uses result in the area of the wind farm having low wilderness quality.

## 2.6 Viewer sensitivity

Defining landscape value requires a consideration of how the physical resource is viewed. This is commonly known as "viewer sensitivity".

Viewer sensitivity is a measure of the significance of the views of the subject site. This significance depends on the type and number of viewers and the significance of the travel route or location from which the site is viewed.

Table 1 is a viewer sensitivity classification table used for determining the sensitivity level of travel routes and locations.

Classification	Type of Use - Existing or Formally Proposed		
	Non-recreation use roads	Recreation and tourism	Settlement
Level 1 High Sensitivity	National & State Highways. Links between cities and major towns including rail	Designated tourist roads. formally or informally at a national or state level, including walking tracks and lookouts. Primary access to these recreation sites or multiple level 2 use areas. Travel routes or sites through or adjacent to scenic or historic areas with recognised or assessed values of national or state significance.	Places with recognised or assessed scenic or historic values of national or state importance.
Level 2 Moderate Sensitivity	Main link roads between towns and highways.	Important but undesignated tourist and recreation roads. Recreation sites of regional importance, including walking tracks and lookouts. Primary access to these recreation sites or multiple level 3 use areas. Travel routes or sites through or adjacent to scenic or historic areas with recognised or assessed values of regional significance.	Places developed to capitalise on views or attractions.
Level 3 Low Sensitivity	Minor link roads	Local recreation	Residential areas other than Level 1 or 2.
Level 4 Very Low Sensitivity	Roads receiving local non-recreational traffic		Industrial areas.

**Table 1: Public Sensitivity Level: Travel Route and Use Area Classification.**

(Based on criteria used in the Visual Management System, Williamson and Calder, 1979)

Level One Sensitivity routes include the Albany Highway, the Kojonup Katanning Road and the Great Southern Highway<sup>8</sup>.

Level Two Sensitivity routes include the Kojonup Broomehill Road and the Tambellup West Road. Sensitivity Level Two sites include homesteads oriented, planned and built to capitalise on views.

The remaining roads are Sensitivity Level Three and Four. They do not have particular regional sensitivity but are the everyday routes taken by the wind farm's occupiers and immediate neighbours. As such, the impacts on them should be given due consideration.

Homesteads that are not oriented, planned and built to capitalise on views are Level Three.

## 2.7 Distance

Distance refers to the distance between the observed landscape and observation points and routes. For assessment purposes, distance has been divided into six zones:

Foreground	< 0.3 km
Close Middleground	0.3 – 1 km
Middleground	1 – 3km
Distant Middleground	3 – 6km
Background	6 km – 15km
Distant Background	>15km

Distance affects the visual characteristics of a wind farm in various ways. Within the distance zones listed above the following general characteristics will be evident:

- **Foreground**, 0-300m. The turbines will be the dominant element in people's experience, with detailed parts of the turbines clearly visible. Only land cover features very close to the viewer will screen the turbines. At this distance the sound of the turbines is likely to be heard. Locations at this distance could be described as being within the wind farm.

*Visibility rating – dominant*

- **Close Middleground**, 300m-1km. Turbines will usually form a major element in the view and will typically be visible from a large proportion of the areas within this zone (except where there is major landform screening or large areas of vegetation). Turbine elements and movements can be clearly recognised. There will be a tendency for the turbines to be more dominant than other landscape

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<sup>8</sup> The wind farm is not seen from the Kojonup Katanning Road and the Great Southern Highway

elements. Focus will be on immediate foreground turbines. Will typically affect a small number of people, often neighbours to a high degree.

*Visibility rating – prominent*

- **Middleground**, 1-3km. This is a critical zone, with large variance in visibility, ranging from relatively prominent where close to low visibility when distant. Turbine elements and movement can be recognised in good weather and light conditions. Observer variables (such as speed and focus sightlines), vegetation cover and (sometimes) atmospheric conditions become critical in determining the obviousness of the turbines. Moderate visual magnitude. Will typically affect a moderate number of people (eg. people using roads and places in the local area) to a moderate degree.

*Visibility rating – visible, often obvious*

- **Distant Middleground**, 3-6km. Turbines will be a minor element at this distance. At the higher distances within this zone, vegetation will often screen views to the turbines from roads even where vegetation is sparse, providing the landform is relatively flat. The visibility of the turbines will sometimes be low due to poor atmospheric/light conditions, especially at greater distances. Observer variables (such as speed and focus sightlines), vegetation cover and atmospheric conditions, are critical in determining the obviousness of the turbines.

*Visibility rating – visible*

- **Background**, 6-15km. Atmospheric conditions start to become a critical determinant of visibility regardless of other factors. The main turbine elements (tower and nacelle) can usually be recognised, with blades and movement recognised in good weather and light by stationary observers. Moderate to low visual magnitude. Will typically affect a moderate number of people (eg. people using roads and places in the region) to a low degree.

*Visibility rating – recognisable, sometime not noticed*

- **Distant Background**, >15km. Turbines may be detected in ideal viewing conditions (eg. elevated positions, clear atmosphere, contrast lighting). Turbines are often not detected. Vegetation typically screens views in gentle terrain, even in areas that include relatively open, cleared paddocks. Low visual magnitude. Atmospheric conditions are a critical determinant of visibility. Will typically affect a low number of people (eg. people using roads and places in the regions) to a low degree.

*Visibility rating – detectable, often not noticed*

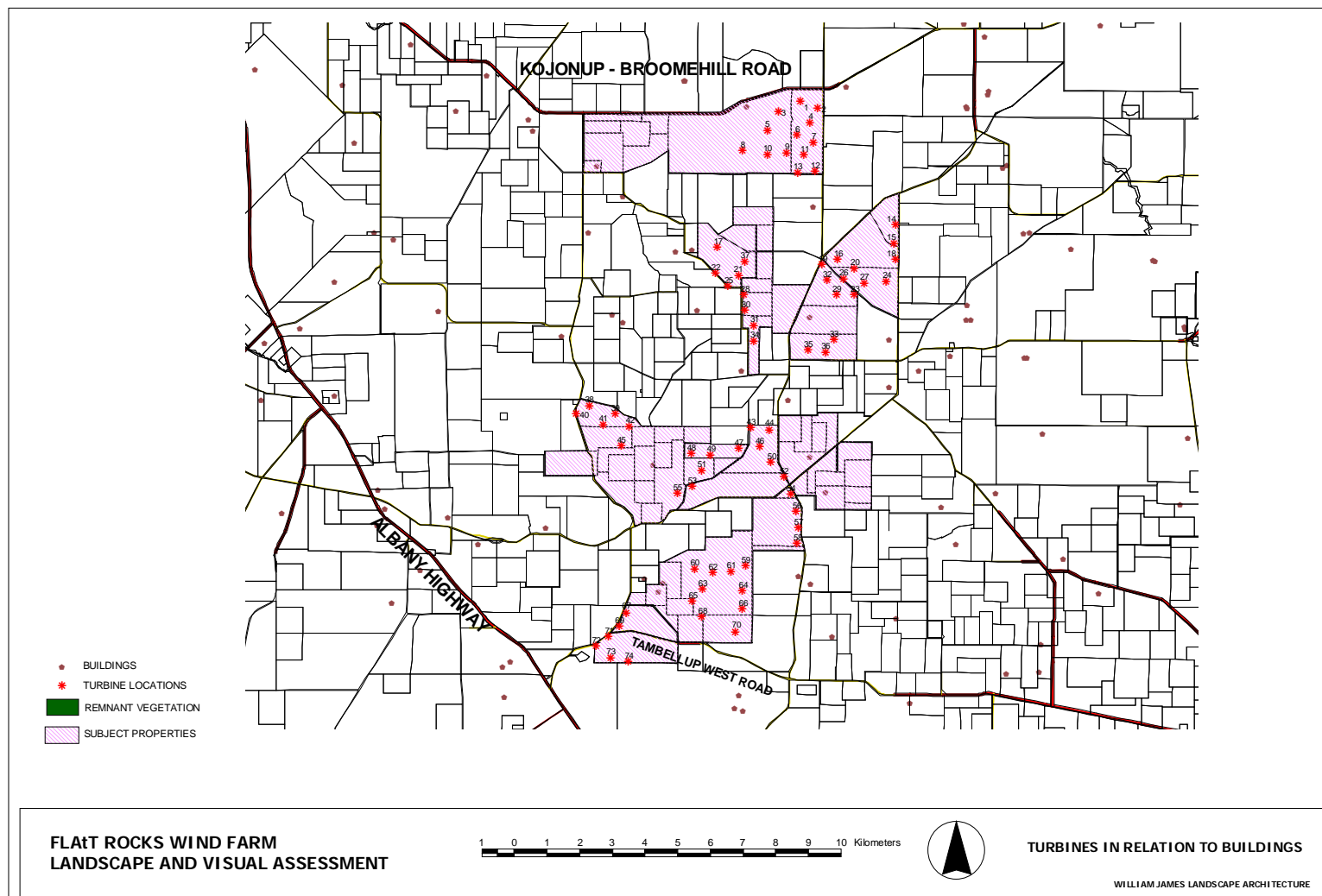


Figure 6: Turbines in relation to buildings

### **3. PLANNING AND POLICY FRAMEWORK**

#### **3.1 Local Government**

The primary planning document for developments such as the Flat Rocks Wind Farm is the local authority Planning Scheme. In the case of the Flat Rocks Wind Farm, which covers two local authority areas, there are two such Schemes:

- The Shire of Kojonup Town Planning Scheme No. 3 and
- the Shire of Broomehill-Tambellup Town Planning Scheme No. 1

In The Shire of Kojonup Town Planning Scheme No. 3 the land is zoned "Rural". In the Shire of Broomehill-Tambellup Town Planning Scheme No. 1 the land is zoned "Farming".

Neither of the Schemes have policies or guidelines relating to the protection of landscape values.

Neither of the Schemes specifically includes or precludes wind farms as a use in the Farming and Rural Zones.

The two Schemes support the maintenance of large farming properties and do not encourage further subdivision within the Rural and farming Zones.

#### **3.2 State Government**

The Western Australian Government is committed to the development of renewable energy sources. In 2007 the Premier issued an action statement entitled "Making Decisions for the Future", which established a local Renewable Energy Target (RET) that aims to increase energy generation from renewable sources in the state's South West Interconnected System to 6% by 2010, 15% by 2020 and 20% by 2025.

#### **3.3 Federal Government**

In 2001 the Australian Government introduced a Mandatory Renewable Energy Target (MRET) scheme which aimed to increase the uptake of renewable energy in Australia's electricity supply by 2%. The Government increased this commitment ensuring that by 2020, 20% of Australia's electricity supply comes from renewable sources.

#### **3.4 National Trust**

There are no sites on the National Trust Heritage List

### 3.5 WA Heritage Council

"Warkelup" on Broomehill Road is listed on the Western Australian Heritage Council's Register of Places. This is outside the subject land.



## 4. MANAGEMENT AIMS AND OBJECTIVES

### Management Objectives

To assist in establishing planning parameters for the project, management objectives and standards have been developed by the author of this study. These are based on the statements and policies contained in relevant planning documents and on generally accepted community perceptions of the significance of landscape and scenery.

### Standards

The objectives give rise to standards derived from generally accepted visual landscape management principles.

The objectives and associated standards relate to the previously identified and surveyed aspects of the landscape, that is :

- Landscape character
- Landscape significance
- Wilderness quality
- Views
- Access

These aspects of landscape contain both opportunities and constraints. Opportunities are provided by the existing conditions and the potential to "add" value to these conditions; constraints are contained in the potential of developments to change the existing conditions in such a way that existing values are diminished or destroyed.

### 4.1 Landscape Character

Landscape character allows the observer to distinguish one landscape from another. It bestows a distinctive sense of place and is the most influential factor in an individual's experience and enjoyment of a landscape. Careful planning, design and management are required to maintain an experience of the existing character.

A development or the cumulative effect of developments may alter the character to such an extent that the character changes from one type to another.

The broad landscape character type of the study area is "rural". This type stands against other character types such as "natural", "settlement", "industrial", "city centre", "suburban". Within these broad types there are characteristics that set one place apart from

another but do not change the character type. Similarly certain elements can be added to or subtracted from a place without changing the character type. Other elements, owing either to their quality or quantity, cannot be added or subtracted without changing the character from one type to another. Central questions that this assessment must address are:

- does the presence of wind turbines change the character type from 'rural' to another character type? and,
- while turbines will change the appearance of the landscape to what extent do they impact on the character?

In only one of the character types listed above – "natural" – might the presence of turbines change the character type. Any evident development will change "natural" character to something other. A wind farm would not change any of the other character types, including rural, to another character type – it is, rather, an additional element in the character type.

The character of the landscape may not change from one type to another by the simple introduction of wind turbines but the magnitude and level of contrast will affect the sensory experience of the landscape and must be considered.

#### 4.1.1 Management Objective

Land use changes and developments should be such that the existing landscape character is protected. In rural character areas, the existing character type should be maintained when viewed from Level 1 and 2 routes and sites.

Priority for protection should be given to areas:

- that have high levels of naturalness
- that are uncommon in the local region; or
- are close to locations with high sensitivity levels (ie. Level 1 and 2)

#### 4.1.2 Standards

- Developments that will change the character from rural to some other character type, should be unseen in distance zones less than middleground (1-3km) and very low impact in greater distance zones.
- Turbines should not be seen in the Foreground or Close Middleground (<1km) from any Level 1 route or location.
- Turbines should generally not be seen in the Foreground or Close Middleground (<1km) from any Level 2 route or location.

- The impacts on Level 3 routes are more a neighbour issue than a regional landscape issue and will be considered in the neighbour level assessment.
- Level 4 routes – because of the proximity to neighbours these roads have been given the same consideration as Level 3 routes.
- Turbines should not be seen in the Foreground or Close Middleground (<1km) from any neighbouring houses.

## 4.2 Landscape Significance

Landscape significance is established by the relevant policies and by distinctive site features.

Landscape significance combines the aesthetic quality of the landscape and viewer sensitivity to give a measure of relative importance of the landscape. Significant landscapes provide the opportunity for the highest enjoyment of the region's natural and cultural landscapes.

Significant landscapes are the most vulnerable to change. Change in these landscapes has the most potential to impact on values.

The relevant policies do not attach particular significance to the landscape being assessed. Features that would lend significance to the landscape are listed in Section 2.2 and mapped in Figure 5.

### 4.2.1 Management Objectives

- Maintain and reinforce natural landscape significance.
- Maintain and reinforce rural landscape significance.

### 4.2.2 Standards

- Protect features of local significance from disturbance.

## 4.3 Wilderness Values

Wilderness quality considers perceptions of wilderness rather than the strict definition of wilderness. Areas of high wilderness quality represent the environment in its most natural state, provide a resource bank and may provide the backdrop and sense of remoteness for other more used areas.

Areas of high wilderness quality offer opportunities for low impact access and nature based experience. Private land of high wilderness

value is not available to the public but experiencing it together with similar public lands strengthens the wilderness experience.

Structures, vehicle access and sophisticated facilities detract from the potential wilderness experience.

The extensive clearing in the study area results in a low wilderness quality.

The low wilderness quality classification requires no specific planning parameters.

## 4.4 Views

Views provide the opportunity to become acquainted with a place or landscape from a distance and put place and landscape into a broader context.

A good view taken in this context is not necessarily one with high scenic value but is one that allows a high degree of visual access.

Visual access to areas of landscape significance may be cut off or obstructed by development or change of use.

Elements introduced into a view may be of such visual magnitude and/or contrast that, although they do not obstruct a view, they have an unacceptable impact on the view. Whether the impact is unacceptable or not depends on the significance of the view and the sensitivity of the viewing location. In the case of the Flat Rocks Wind Farm the regionally significant view is of the distant Stirling Ranges.

### 4.4.1 Management Objectives

- Maintain significant views over the site.
- Do not obstruct significant views

### 4.4.2 Standard

- Views over the site should be maintained when viewed from Level 1 or 2 routes or locations in the middleground (1-3km) or closer.
- Wind turbines should not obstruct views of the Stirling Ranges from Level 1 or 2 routes or locations.

## 4.5 ACCESS

Access to a place, generally for recreation, is one of the ways in which the landscape is experienced and enjoyed. Public access is, therefore, a

major factor in determining the values of a particular landscape. The Flat Rocks Wind Farm will be on private land that is currently not available for public access. The land in which the wind farm will be developed will remain private land under agricultural uses and will continue to be unavailable for public access and use.

There are no Management Objectives for Access.

## 5. IMPACT ASSESSMENT

This section describes the proposed development and the anticipated physical and visual impacts and assesses these impacts against the landscape values.

First the elements of the development are described. Then the visibility of these elements from various locations is described. The impacts are then tested against the landscape descriptors of Character, Significance, Access, Views and Wilderness Quality.

### 5.1 THE PROJECT

#### 5.1.1 Project Description

The proposal is for a 74 turbine wind farm. Each turbine generates 2mW of electricity.<sup>9</sup> The towers to the top of the turbines are 84m high and the blades have a diameter of 112m, giving an overall height of 140m. The operating life of the wind farm is 20 years, after which, subject to further planning approval, it will be refurbished and continue operating, or be decommissioned and removed.

The turbines - tower, nacelle and blades, will be matt light-grey in colour.

The proposed wind farm is on private farm land approximately 20km south east of Kojonup, 27km north west of Tambellup, 16 km west of Broomehill and 27km south west of Katanning. The development is spread over six farming properties. The total area of the development envelope is 6,480ha of which approximately 30ha will be directly affected.

Ancillary structures and infrastructure will include:

- a base foundation to each turbine of 15m diameter by 1.5m high
- a crane hardstand of approximately 22m by 40m located adjacent to each turbine foundation
- approximately 40km of on-site tracks
- approximately 96km of cabling – mostly beneath the ground
- one or two permanent meteorological masts
- temporary construction compounds and laydown areas
- temporary concrete batching plant
- aviation lighting is not mandatory but it is likely that approximately 14 red lights of medium intensity will be mounted at

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<sup>9</sup> For this assessment the turbines modelled and assessed are 3mW units. This is done to present a “worst case” scenario. The final wind farm will be either 74 of the smaller 2mW units or a lesser number of the 3mW units.

nominal 900m spacings on turbines at the perimeter of the wind farm - directed upwards as aircraft warning lights.

- Construction activity and increased heavy and light vehicle movements will be visible in the short term.

The electricity generated by the wind farm will be fed into either the proposed Muja-Southdown 330kV overhead transmission line or, if this is not available, the proponents will construct a 132kV line to Kojonup using the same route as the proposed 330kV line. The proposed Muja-Southdown line has been the subject of an earlier Landscape Assessment.

## 5.1.2 Project Visibility

The turbines will be the most visible elements of the development. The other structures and infrastructure, apart from the transmission line - the subject of an earlier assessment, will only be visible from within the development itself.

### 5.1.2.1 ZONE OF VISUAL INFLUENCE MAPPING

Garrad Hassan Pacific Pty Ltd (GL Garrad Hassan) supplied digital mapping showing the Zone of Visual Influence (ZVI) of the wind farm. The mapping shows locations from which varying numbers of turbines would be visible if there were no intervening vegetation. There are two maps, one showing visible tips of blades at the top of the rotation and the other showing the hubs. The tips of blades are obviously more visible, and seen over greater distances, than the hubs. The Zones of Visual Influence are predicted using digital landform information only. Vegetation is not taken into account. Intervening vegetation will influence the visibility of the turbines - the closer the vegetation is to the observer, the greater will be the influence.

The ZVI is a useful tool for identifying the places from which the turbines may be visible. It does not show how much of the turbines will be seen apart from whether only the blades are seen or blades and towers.

The ZVI should not be interpreted as a map of the visibility of the turbines or, more importantly, as an indicator of the visual impact of the turbines. It is an indication of possible visibility.

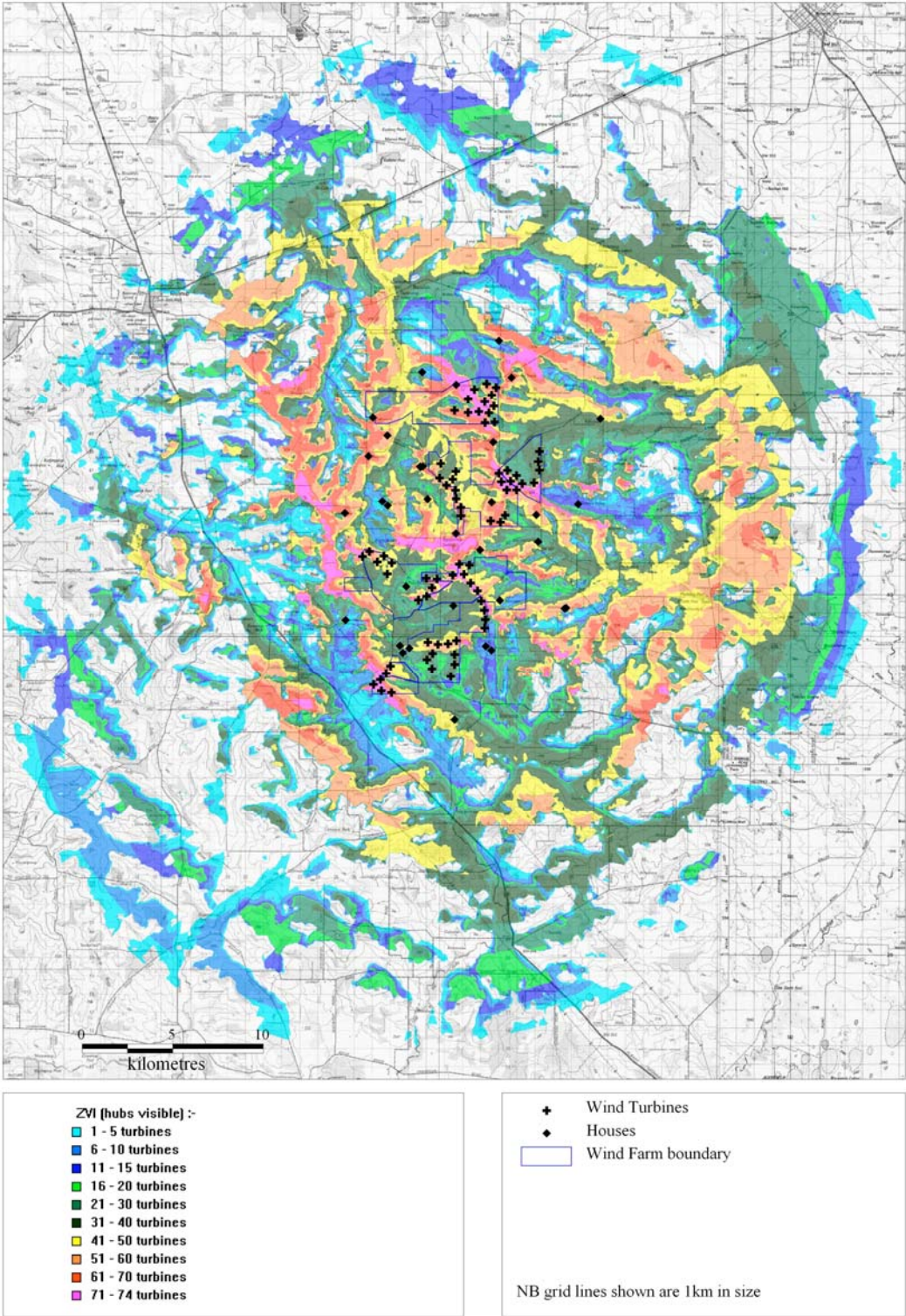


Figure 7: Zone of Visual Influence of Hubs <sup>10</sup>

<sup>10</sup> Supplied by GL Garrad Hassan. Based on landform only – does not take account of vegetation.



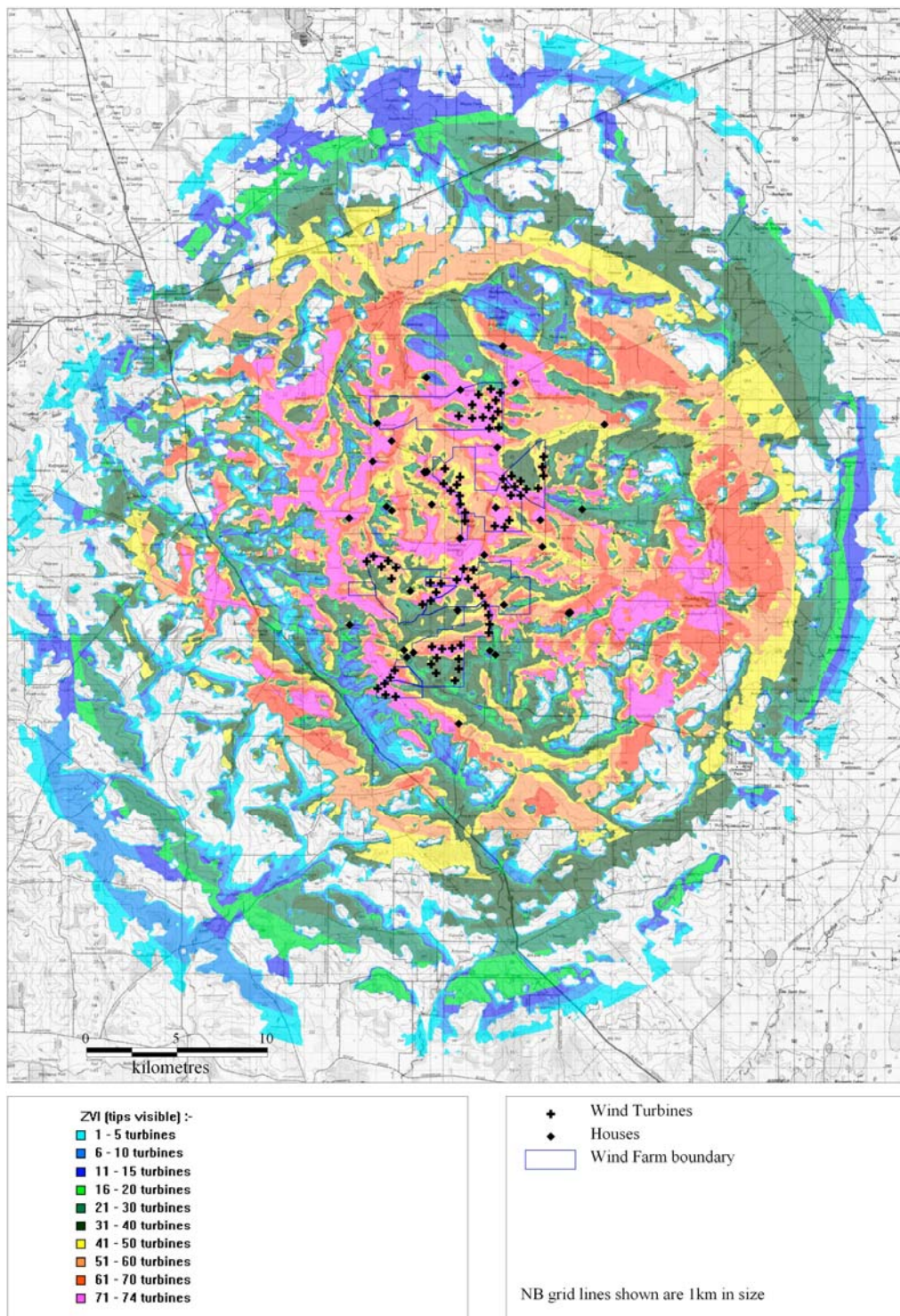


Figure 8: Zone of Visual Influence of Tips of Blades<sup>11</sup>

<sup>11</sup> Supplied by GL Garrad Hassan. Based on landform only – does not take account of vegetation

#### **5.1.2.2 FIELD SURVEY**

A survey of all the roads in the vicinity of the wind farm was undertaken over three visits, one in October 2010 and two in February 2011. During the third visit a number of neighbour's houses were visited. The first of the visits was an initial familiarisation with the layout of the wind farm, the second visit was a landscape character and significance survey, the third visit involved taking photographs and making field notes at identified viewing locations. For part of each of the visits the author was accompanied by a one of the proponents. The local knowledge of the proponents was invaluable in orienting the author in relation to the turbine locations and also in providing background information on the community use patterns and the social values of the landscape.

The author is grateful to the neighbours who invited him to visit their houses and gardens and to photograph the landscape in order to produce some of the photo-simulations that appear in this report.

#### **5.1.2.3 COMPUTER MODELLING AND PHOTOSIMULATION**

In order to determine the visibility and appearance of the wind farm from various locations, renders were produced from a computer model developed using 10m contours. These contours were also used to create the landform map that appears earlier in this report<sup>12</sup>. The computer rendering software is Visual Nature Studio. This software produces a 3D terrain model into which the accurate locations and heights of the turbines are entered. 3D renderings are generated from chosen viewpoints, showing the turbines accurately represented in the terrain. Vegetation and ground cover are modelled by "draping" an aerial photograph over the terrain model. A height is given to the vegetation and then, using images of actual vegetation in the landscape under study, the vegetation is represented in the rendering. In the case of the renderings produced for this study, the height of the vegetation is set at about one third of the actual size. This is done so that the turbines are rendered more visibly so that a reviewer may easily visualise them in the landscape. From these renderings a photo-simulation is produced that uses photographs taken from the same location as the rendering "camera-point". Using PhotoShop software, photographs<sup>13</sup> are draped over a rendering and the turbines are introduced into the photographic image in the location and to the height that they would be in the landscape as viewed from the camera location.

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<sup>12</sup> The mapping in this report, including the landform map were produced using ArcView GIS software.

<sup>13</sup> The photographs in this report were taken with a Nikon Coolpix 5400 digital camera set to emulate a 35mm camera fitted with a 50mm lens.

The difference in vegetation height between the actual size, as represented by the photographs, and the size represented in the renderings is readily apparent.

## 5.2 Impact on views

The impact of the wind farm on views is represented in the renderings and photo-simulations that follow. The locations of the rendering camera-point and the photo-locations are shown in the Figure below.

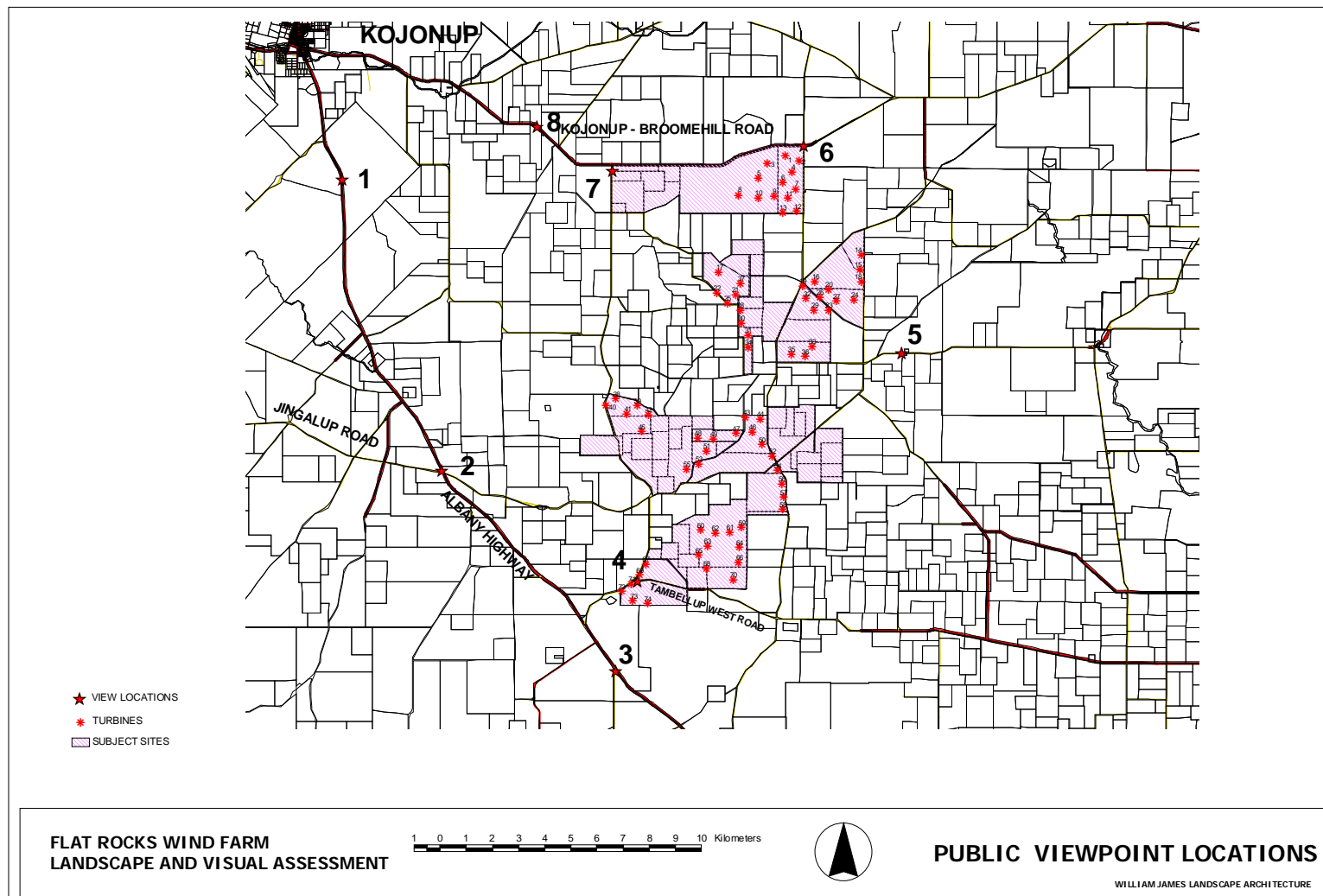


Figure 9: Photo location from public viewpoints





Computer render of view from location 1 with proposed turbines



Photo simulation of view from location 1 with proposed turbines

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 1 Simulations



Computer render of view from location 2 with proposed turbines



Photo simulation of view from location 2 with proposed turbines

**Figure 11: Render and photosimulation of view from location 2**





Computer render of view from location 3 with proposed turbines



Photo simulation of view from location 3 with proposed turbines

**Figure 12: Render and photosimulation of view from location 3**

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 3 Simulations



Computer render of view from location 4 with proposed turbines

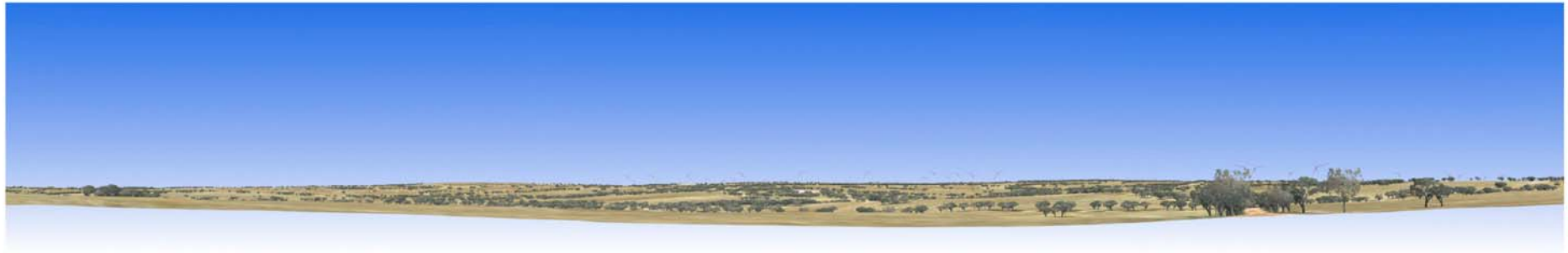


Photo simulation of view from location 4 with proposed turbines

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 4 Simulations

**Figure 13: Render and photosimulation of view from location 4**





Computer render of view from location 5 with proposed turbines



Photo simulation of view from location 5 with proposed turbines

**Figure 14: Render and photosimulation of view from location 5**



Computer render of view from location 6 with proposed turbines



Photo simulation of view from location 6 with proposed turbines

**Figure 15: Render and photosimulation of view from location 6**



Computer render of view from location 7 with proposed turbines



Photo simulation of view from location 7 with proposed turbines

**Figure 16: Render and photosimulation of view from location 7**





Computer render of view from location 8 with proposed turbines



Photo simulation of view from location 8 with proposed turbines

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 8 Simulations

Figure 17: Render and photosimulation of view from location 8



### 5.2.1 Results of computer modelling and photosimulations

The renderings and photosimulations represent the appearance of the wind farm from selected locations in the middle of a clear day in summer. The appearance will constantly change with the atmospheric conditions, the time of day, the weather and the seasons. Changes of longer duration will result from the growth, decay and death of intervening vegetation. The locations were chosen were the key views and a representative sample of typical viewing locations where there were likely to be views of the wind farm. Several of the locations - 1, 4 and 8 were nominated by the Shires of Kojonup and Broomehill-Tambellup.

The renderings and photosimulations demonstrate that turbines will be highly visible from certain locations, barely visible from others and not visible from others. They also demonstrate that from no single location will all of the turbines be visible at once. The following is a summary of the predicted visibility of the wind farm various public roads<sup>14</sup>.

Road	Visibility and Appearance	Distance Zone
<b>Sensitivity Level One Roads</b>		
Albany Highway	<p>Travelling south from Kojonup the wind farm would be first seen from the position shown as Location 1 on the photo location map. A group of turbines would be just visible emerging over a distant ridge at distances of about 13km . Only the nacelles and blades would be visible. The visual magnitude and contrast is very low.</p> <p>The wind farm would be largely unnoticed from the remainder of the Albany Highway. If it is seen, it will be glimpses of a small number of turbines through trees at a distance generally greater than 13km.</p>	<p>Background</p> <p>Distant Background</p>
Kojonup Katanning Road	The wind farm would not be seen from the Kojonup Katanning Road	
Great Southern Highway	The wind farm would not be seen from the Great Southern Highway.	
<b>Sensitivity Level Two Roads</b>		
Kojonup Broomehill Road	The wind farm would be part of the experience of driving along the western half of Kojonup Broomehill Road. It would come and go in the view for an approximate 15-20k stretch of road. The closest it would be seen is approximately	Close middleground to Distant Background

<sup>14</sup> Views from private dwellings will be discussed separately

	<p>650m and the furthest more than 12km.</p> <p>From Location 6, several turbines would be visible at varying distance zones. They would be seen at wide angles to the direction travel on Kojonup Broomehill Road. The closest turbines would be approximately 650m away, the furthest approximately 3.6km. The visual magnitude and contrast is moderate.</p> <p>From Location 7, many turbines will be visible at distances ranging from 5km to 10km. Some would be in the focus of the view and others at wide angles to the direction of travel when travelling east. The turbines would be visible emerging over distant ridges. Although the number of the visible turbines is high the overall visual magnitude and contrast would be low.</p> <p>From Location 8, many turbines would be visible at distances ranging from 8km to 12km or more. The nearer turbines would be seen on the left hand side of the road and the further ones on the right when travelling east. The turbines would be visible emerging over distant ridges. Although the number of the visible turbines is high the overall visual magnitude and contrast would be low.</p>	<p>Close Middleground and Middleground</p> <p>Distant Middleground and Background</p> <p>Distant Middleground to Distant Background</p>
Tambellup West Road	<p>The wind farm would be very much part of the experience of driving along western end of Tambellup West Road. It would come and go in the view for approximately 8km. The closest turbine would be approximately 80m and the furthest more than 12km.</p> <p>From Location 4, turbines would be seen on both sides of the road from 80m to more than 12km. The visual magnitude and contrast would be high. An observer would feel as though they were within the wind farm in this location.</p>	<p>Foreground to Background.</p> <p>Foreground to Background.</p>
<b>Sensitivity Level Three and Four Roads</b>		
Minor local roads within the area of the wind farm	<p>The wind farm would be very much part of the experience of driving on the minor local roads. It would come and go in the view from these roads. The closest turbine would be approximately 60m and the furthest more than 12km. From some locations on these roads the visual magnitude and contrast would be high and others low and medium.</p>	<p>Foreground to Background.</p>

	Location 5 is just west of the Flat Rocks Tennis Club. From this location on Ngopitchup Road, turbines would be visible straight ahead at about 3.5km and out to the left at about 10km. From this location the visual magnitude and contrast would be low	Middleground to Background
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## 6. IMPACT ON VALUES

### 6.1 Impacts on objective and standards

This section deals with the potential impacts of the proposed development on the derived objectives and standards.

The wind farm as described and mapped is tested against the management objectives relating to landscape character, landscape significance, wilderness quality and views. The degree of conformity is assessed as being high, medium or low. If the degree of conformity is high the objectives are deemed to be met. If it is low or medium, modification of the development is necessary to bring it into conformity with the objectives.

The objectives and associated standards relate to:

- Landscape character
- Landscape significance
- Wilderness quality, and
- Views
- Access

#### 6.1.1 Landscape Character

##### **MANAGEMENT OBJECTIVE**

Land use changes and developments should be such that the existing landscape character is protected. In rural character areas, the existing character type should be maintained when viewed from Level 1 and 2 routes and sites. This means that character change should not be recognised from these routes and sites regardless of distance.

Priority for protection should be given to areas:

- that have high levels of naturalness
- that are uncommon in the local region; or



- are close to locations with high sensitivity levels (ie. Level 1 and 2)

#### **STANDARDS**

- Developments that will change the character from rural to some other character type, should be unseen in distance zones less than middleground (1-3km) and very low impact in greater distance zones.
  - ❑ The presence of wind turbines will not change the character type from "rural" to another character type.
- Turbines should not be seen in the Foreground or Close Middleground (<1km) from any Level 1 route or location.
  - ❑ No turbines are seen in the Foreground and Close Middleground (300m to 1km) from Level 1 travel routes.
- Turbines should not be seen in the Foreground or Close Middleground (<1km) from any Level 2 route or location.
  - ❑ Some turbines are seen in the Foreground and Close Middleground (<300m to 1km) from Level 2 travel routes. This occurs near the junction of Kojonup Broomehill Road and Nookanellup Road, and near the junction of Tambellup West Road and Potts Road
  - ❑ Level 3 and 4 roads are the local roads that most affect neighbours of the wind farm. They will be considered in the neighbour-level assessment
- Turbines should not be seen in the Foreground or Close Middleground (<1km) from any neighbouring houses.
  - ❑ No turbines are within 1km of neighbouring houses

**The development demonstrates a medium level of compliance with the objectives for Landscape Character**

### **6.1.2 Landscape Significance**

Landscape significance is established by the relevant policies and by distinctive site features.

Landscape significance combines the aesthetic quality of the landscape and viewer sensitivity to give a measure of relative importance of the landscape. Significant landscapes provide the opportunity for the highest enjoyment of the region's natural and cultural landscapes.

Significant landscapes are the most vulnerable to change. Change in these landscapes has the most potential to impact on values.

The relevant policies do not attach particular significance to the landscape being assessed. Features that would lend significance to the landscape are listed in an earlier section and mapped in Figure 5.

#### **MANAGEMENT OBJECTIVES**

- Maintain and reinforce natural landscape significance.
- Maintain and reinforce rural landscape significance.

#### **STANDARDS**

- Protect features of local significance from disturbance.
- The proposed wind farm does not disturb any significant landscape features.

**The proposed development demonstrates a high level of compliance with the objectives for Landscape Significance**

### **6.1.3 Wilderness Values**

Wilderness quality considers perceptions of wilderness rather than the strict definition of wilderness. Areas of high wilderness quality represent the environment in its most natural state, provide a resource bank and may provide the backdrop and sense of remoteness for other more used areas.

Areas of high wilderness quality offer opportunities for low impact access and nature based experience. Private land of high wilderness value is not available to the public but experiencing it together with similar public lands strengthens the wilderness experience.

Structures, vehicle access and sophisticated facilities detract from the potential wilderness experience.

The extensive clearing results in a low wilderness quality.

**The low wilderness quality classification requires no further assessment of impacts**

### **6.1.4 Views**

Views provide the opportunity to become acquainted with a place or landscape from a distance and put place and landscape into a broader context.

A good view taken in this context is not necessarily one with high scenic value but is one that allows a high degree of visual access.

Visual access to areas of landscape significance may be cut off or obstructed by development or change of use.

Elements introduced into a view may be of such visual magnitude and/or contrast that, although they do not obstruct a view, they have an unacceptable impact on the view. Whether the impact is unacceptable or not depends on the significance of the view and the sensitivity of the viewing location. In the case of the Flat Rocks Wind Farm the significant view is of the Stirling Ranges.

#### **MANAGEMENT OBJECTIVES**

- Maintain significant views over the site.
- Do not obstruct significant views

#### **STANDARD**

- Views over the site should be maintained when viewed from Level 1 or 2 routes or locations in the middleground (1-3km) or closer.
  - ❑ The wind farm will not cut off any views regardless of Sensitivity Level or distance.
- Views of the Stirling Ranges should not be obstructed by wind turbines when viewed from Level 1 or 2 routes or locations.
  - ❑ The wind farm will not obstruct views of the Stirling Ranges from any Level 1 or 2 routes or locations.

**The proposed development demonstrates a high level of compliance with the objectives for Views.**

The impact of the wind farm on the view of the Stirling Ranges from a private homestead is considered under Section 6.5 - Effect on Neighbours

### **6.1.5 Access**

Access to a place, generally for recreation, is one of the ways in which the landscape is experienced and enjoyed. Public access is, therefore, a major factor in determining the values of a particular landscape. The Flat Rocks Wind Farm will be on private land that is currently not available for public access. The land in which the wind farm will be developed will remain private land under agricultural uses and will continue to be unavailable for public access and use.

**There are no Management Objectives for Access.**

## 6.2 Effect on the Representation of Landscape Values in the Region

The values of the proposed wind farm site are well represented in the region. Values will be affected in the vicinity of the wind farm but will remain well represented over the region.

## 6.3 Effect on Recreation and Tourism Values

Because wind farms are uncommon occurrences in the landscape it is quite possible that the wind farm will attract tourism to the district. As wind farms become less of a novelty this attraction may diminish.

The wind farm is very unlikely to adversely affect tourism in the Kojonup area.

## 6.4 Cumulative Effect

There are no wind farms within close proximity to the proposed Flat Rocks Wind Farm. The closest wind farms are at Mt Barker, 120km away, Albany, 180km away and Merredin, nearly 300km away. There will be no cumulative effect.

## 6.5 Effect on Neighbours

Neighbours will experience the wind farm on a day to day basis. Turbines will be visible from local roads, from neighbouring properties and in some cases from neighbouring homesteads and gardens.

No turbine is closer than 1km to a neighbouring homestead. There are seven neighbouring homesteads between 1-3km of a wind turbine. In most of these cases the turbines will have a low impact on the views from the houses and gardens because of remnant and planted vegetation.

Renderings and photosimulations from a number of neighbouring houses and gardens are shown in the following figures. The locations of the viewpoints are shown in Figure 18.

Visual Impacts from surveyed private properties:

### **Location 9:**

The render indicates that one wind turbine may be visible at a distance of 1.3km to the north north west. This, however, is unlikely to occur as the trees in the foreground have been deleted from the render. These trees, shown on Figure 18 will very probably screen the turbine. If this is not the case, additional trees could be planted to the north of the house.<sup>15</sup>

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<sup>15</sup> This and other planting within neighbours' properties to screen turbines would be done by the proponents in consultation with the affected neighbour.

The photosimulation shows that no turbines to the west of the house will be visible.

#### **Location 10**

The render shows turbines in the background looking out from the eastern garden – the trees have been deleted from the render to allow these turbines to be seen. The photosimulation indicates that a number of turbines will be visible from the eastern garden in the distant middleground at 3-5km and from the southern garden in the distant middleground-background at 5-7km. They will be seen through trees and behind remnant vegetation.

The visible turbines will have a low visual impact.

#### **Location 11**

The render indicates that five turbines may be visible in the middleground at a distance of 1.1km to 2.2km. The photosimulation shows that two or three turbines will be visible from the garden with the existing vegetation in place. It is possible that Western Power will require the removal of the large eucalypt in the centre foreground. This will expose two more turbines.

The turbines will have a moderate impact on views from this location.

Planting could be used to screen the turbines while directing views to the distant landscape.

#### **Location 12**

The render and photosimulation indicate that no turbines will be visible from this location.

#### **Location 13**

There is no photosimulation from this location<sup>16</sup>. The render indicates that 12 turbines would be visible at distances ranging from 1.1km to 3.7km (middleground-distant middleground) with existing trees at their actual size.<sup>17</sup>

The render shows that the turbines will not interfere with the view to the distant Stirling Ranges.

The visible turbines will have a moderate impact on views from this location.

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<sup>16</sup> The owners did not invite the author to take photographs from their property.

<sup>17</sup> The trees in the render are one third of their actual size and some have been cut off to indicate the location of the turbines.

Planting to the west of the house would screen the twelve turbines while retaining the remainder of the view.

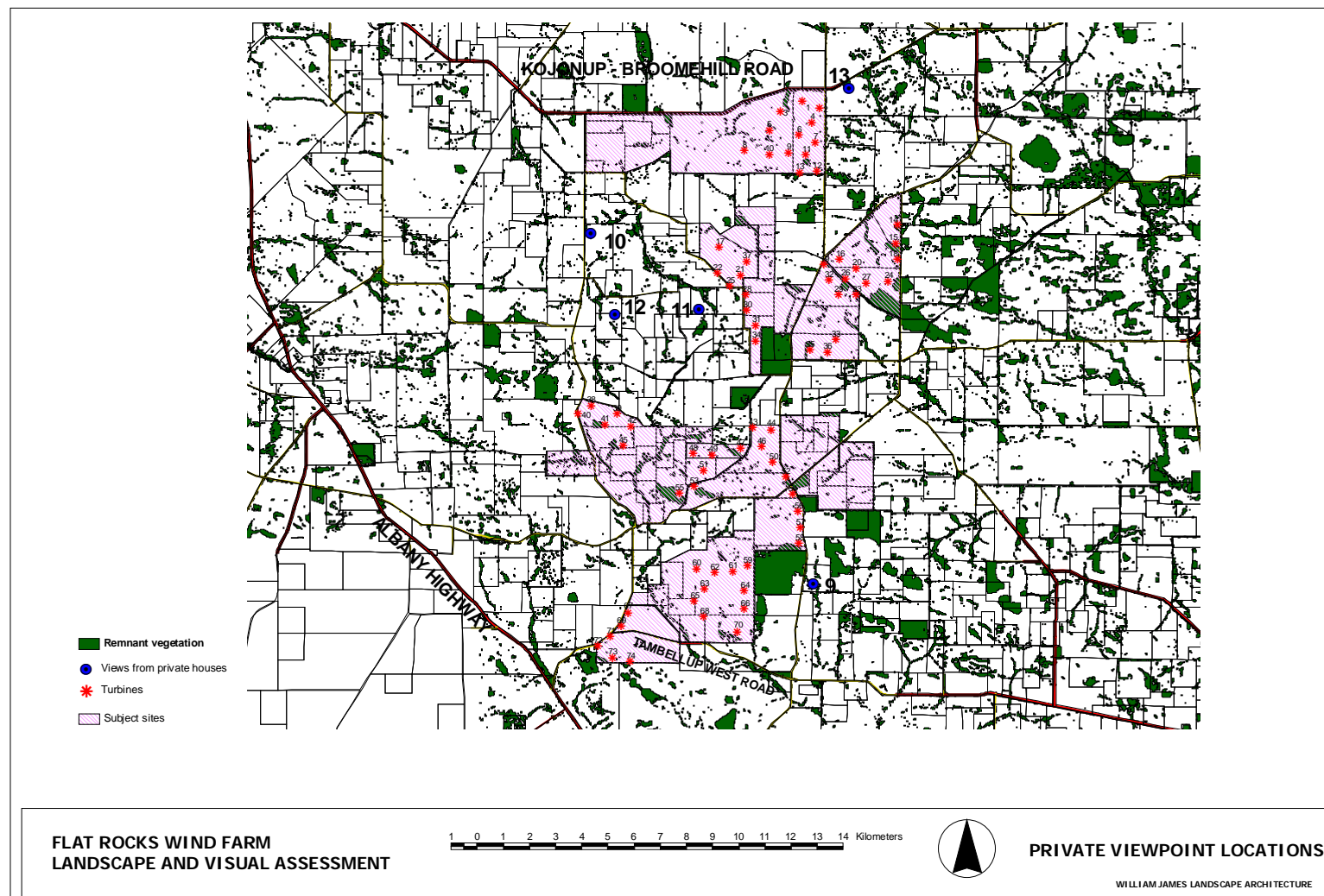


Figure 18: Location of private property viewpoints



Computer render of view from location 9 with proposed turbines



Photo simulation of view from location 9 with proposed turbines

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 9 Simulations

**Figure 19: Render and photosimulation of view from location 9**





Computer render of view from location 10 with proposed turbines



Photo simulation of view looking south from front garden from location 10, with proposed turbines



Photo simulation of view looking east from location 10, with proposed turbines

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 10 Simulations

**Figure 20: Render and photosimulation of view from location 10**



Computer render of view from location 11 with proposed turbines



Photo simulation of view from location 11 with proposed turbines

**Figure 21: Render and photosimulation of view from location 11**





Computer render of view from location 12 with proposed turbines



Photo simulation of view from location 12 with proposed turbines

**Figure 22: Render and photosimulation of view from location 12**

Flat Rocks Wind Farm  
Landscape and Visual Assessment  
Location 12 Simulations

Computer render of view from location 13 with proposed turbines



**Figure 23: Render of view from location 13**

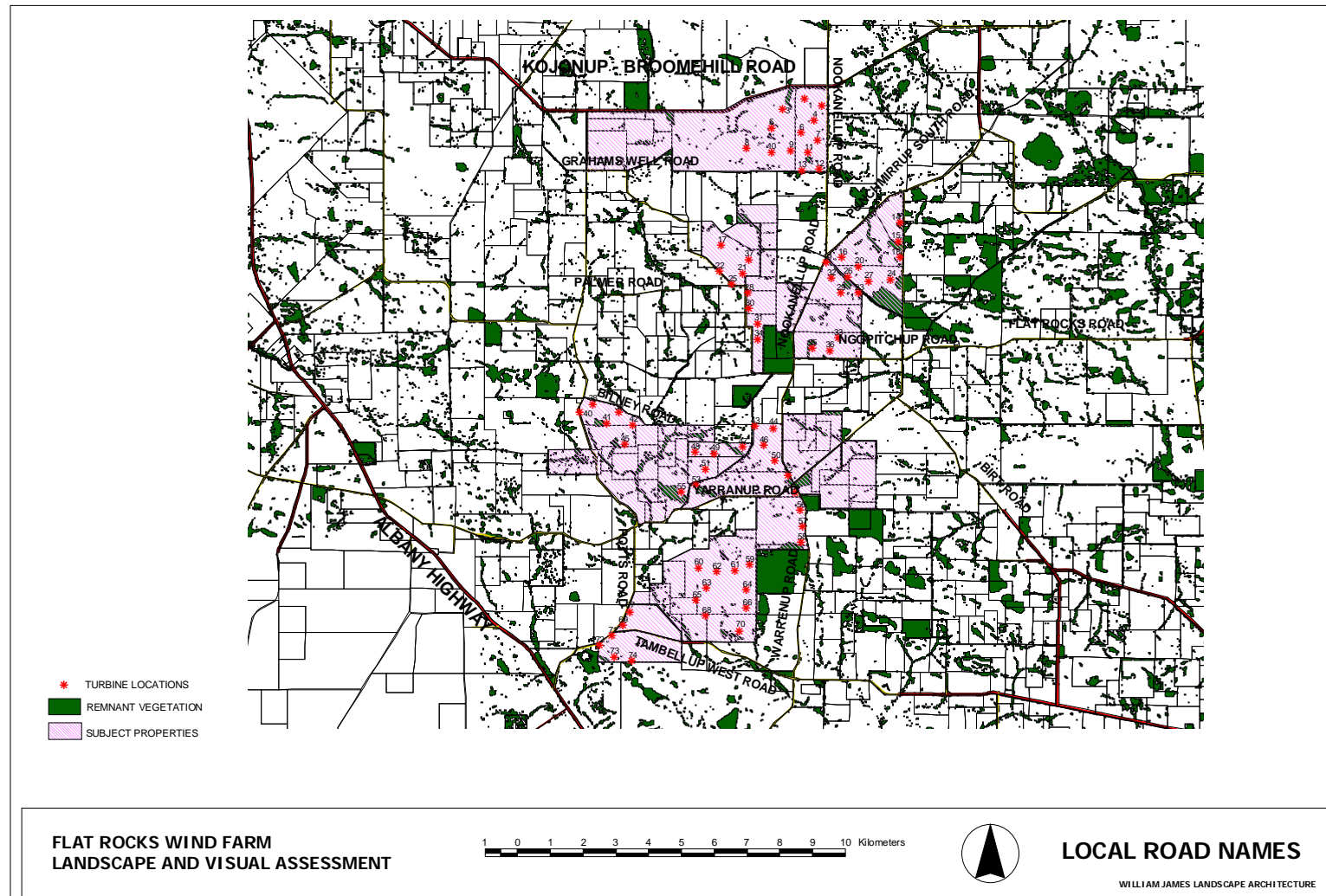


Figure 20: Local road names

### 6.5.1 Local Roads

The impact of turbines on the local roads is more a neighbour level issue than a regional landscape issue. The occupiers of the wind farm and their neighbours use these roads in their day-to-day lives and will experience the wind farm as part of their everyday activities.

The local roads are classified as having Level 3 and Level 4 Sensitivity. The impact of the turbines on the values experienced on the local roads is assessed below.

Turbines are at varying distances from these roads - none would be closer than 60m.

#### **Nookanellup Road**

Three of the turbines in the northern cluster are in the Foreground of the view from Nookanellup Road. Roadside vegetation in this section of the road will partially screen the turbines from view. The turbines are approximately 1km apart and will be experienced as single elements seen through a line of trees at right angles to the road. They will have a low impact on values.

A single turbine is within the foreground of the view near the corner of Punchmirrup and Nookanellup Roads. This turbine is in the focus of the view when travelling south on Nookanellup Road. It will have a moderate impact on values.

Two turbines are within the Foreground of the view from Nookanellup Road south of Punchmirrup Road. There is little vegetation on the road verge between the road and the turbines. The turbines will be seen when travelling in either direction. The turbines will have a moderate impact on values.

#### **Warrenup Road**

Four turbines are within the Foreground of the view from Warrenup Road. A staggered line of turbines runs parallel to the road for approximately 4km. They are between half a kilometre and one kilometre apart. There is little vegetation on the road verge between the road and the turbines. The turbines will be seen when travelling in either direction. The turbines will have a moderate impact on values.

**Grahams Well Road**

Six turbines are within the Foreground view from Grahams Well Road. Two to north of Palmer Road and four to the south. There is a continuous strip of roadside vegetation between the road and the turbines which will partially screen the turbines from view. The turbines will have a low impact on values.

**Potts Road**

One turbine just south of Bilney Road is with the Foreground view from Potts Road. There is no intervening vegetation. This turbine will have a moderate impact on values.

Two turbines north of Tambellup West Road are with the Foreground view. Roadside vegetation will partially screen these turbines. They will have a low impact on values.

**Bilney Road**

Three turbines are within the Foreground. Roadside vegetation will partially screen these turbines. They will have a low impact on values.

**Ngopitchup Road**

One turbine is within the Foreground. Roadside vegetation will partially screen this turbine. It will have a low impact on values.

## 6.6 Current Community Sentiment in Regard to Wind Farms

At a general level, other wind farm community involvement programmes provide an insight into the nature of possible concerns relating to wind farms. Concerns generally fall under the following topics:

- health concerns
- construction and management of the facility
- general impacts on the community
- landscape and visual amenity
- noise
- planning
- land values and rates, and
- physical impacts

The proponents of the Flat Rocks Wind Farm have conducted several public meetings and community information days to inform neighbours and the broader community of the wind farm development and staging process. The first public meeting was on the 6<sup>th</sup> of August 2008 to inform neighbours of the project and the intention to erect an 80m wind monitoring mast. 17 neighbours were invited – 3 attended. 49 neighbours were invited to second public meeting with 13 attending.

A public information day was held in Kojonup and Broomehill on the 16<sup>th</sup> of May 2011. Approximately 380 invitations were sent out for the Broomehill event with 31 attending. Approximately 1100 invitations were sent out for the Kojonup event with 58 attending.

Specific concerns raised by local people and relayed to the proponents during community information days include:

- setback from houses – 2km setbacks sought
- effects on health
- fire safety
- aviation and crop spraying
- property values
- power line access
- shadow flicker
- noise
- loss of visual amenity
- effect on views

A number of these concerns – those relating to landscape and visual amenity have been addressed in this report.

## **7. EVALUATION**

### **7.1 Compliance with the Planning/Policy Framework**

The degree of change to landscape values is low when viewed from the Albany Highway, the only Sensitivity Level One travel route that provides views of the wind farm. They are visible only in the Background.

From the Level 2 roads the wind farm will result in a moderate level of change to landscape values. This results from the proximity of turbines to the roads – turbines are visible within the Foreground and Close Middleground.



Turbines are visible in the Foreground and Close Middleground from Level 3 and 4 roads.

The local government Planning Schemes provide little guidance in managing landscape values. The state government has provided guidance for minimising the visual impact of wind farms through Planning Bulleting 76 "Guidelines for Wind Farm Development" and the WAPC "Visual Landscape Planning Manual".

The following section recommends modifications to lessen the visual impact of the turbines on Level 2, 3 and 4 travel routes, thereby reducing the overall level of change to landscape values.

## **8. RECOMMENDATIONS, DESIGN MODIFICATIONS AND GUIDELINES**

The wind farm will have moderate impact on landscape character and low impact on significance.

### **8.1 Planning and design principles to minimise the impact of the proposed development.**

The application of the following general planning and design principles helps to minimise the impacts of the wind farm<sup>18</sup>.

- Ensure all turbines look alike, have a clean, sleek appearance and that the blades rotate in the same direction.
- Minimise the number of turbines, as appropriate, by using the largest possible model rather than numerous small ones.
- Site the turbines, ancillary buildings, access roads and transmission infrastructure to complement natural landform contours.
- Ensure the choice of materials and colour (e.g. off white and grey for turbines, low contrast for roads) for the development complements the skyline and the backdrop of the view sheds.
- Minimise removal of vegetation and use advanced planting and vegetation screens as visual buffers where appropriate.
- Ensure good quality vegetation and landform rehabilitation, on-site and off-site, where appropriate.
- Locate turbines to reflect landscape and topographical features (in this case a random pattern will suit a rolling, varied landform).
- Avoid clutter, such as advertisements and apparatus.

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<sup>18</sup> From Planning Bulleting 76 "Guidelines for Wind Farm Development"

## 8.2 Neighbour level assessment

The neighbour level assessment indicates that some neighbouring residences will experience no visual impacts while others will experience low and moderate impacts. Some neighbouring residences may require planting. This would be done by the proponents in consultation with the affected neighbours.

The turbines will have a low to moderate impact on values experienced from local roads. Where the turbines are within the foreground of the view from local roads and there is no roadside vegetation between the road and the turbine it is recommended to either relocate the turbines or plant screening vegetation adjacent to the road reserve.

## 8.2 Modifications

Several modifications should be considered.

The following turbines should be either relocated from the road or screened from the adjacent road with planting.

- Turbines 1,2 and 3, either relocate 1km from Kojonup Broomehill Road or screen from the road
- Turbines 19, 50 and 52, either relocate 300m from Nookanellup Road or screen from road.
- **Turbine 40**, either relocate 300m from Potts Road or screen from road.
- Turbines 54, 56, 57 and 58, either relocate 300m from Warrenup Road or screen from road
- Turbines 67, 69, 71, 72, 73 and 74 are clustered close to the intersection of Tambellup West Road and Potts Road. There is an opportunity here to provide a location conveniently close to Albany Highway for viewing the wind farm. A roadside information bay could be established on Tambellup West Road near the intersection with Potts Road with a direction sign on Albany Highway. If this is not practical or acceptable then the turbines should be screened from Tambellup West Road.
- Planting options for private houses are discussed under Section 6.5 *Effect on Neighbours*.

## 9. CONCLUSION

If the above recommendations are carried out, the degree of change to landscape values would remain low when viewed from the Albany Highway, the only Sensitivity Level 1 travel route.

The level of change to values when viewed from Sensitivity Level 2, roads would be reduced from low/moderate to low.

The level of change to values when viewed from Sensitivity Level 3 and 4 roads would be reduced from to low/moderate to low.

If the planting proposals for private houses are carried out the level of change to values will be low.

## 10. DEFINITIONS

**Aesthetics** refers to the personal appreciation and enjoyment of beautiful things (eg. objects, places and processes). It can include functional and non-functional things and does not necessarily include visual quality.

**Evaluation** is the process where assessment results are examined and used to make decisions about existing or proposed developments.

**Impact Assessment** is a process of determining how changes to the environment will affect landscape values.

**Landscape Assessment** is the process of analysing and mapping environmental characteristics and, using known criteria, determining those that contribute most to the experience and enjoyment of people.

**Landscape** refers to a person's perception of the external environment. It is a human construct.

**Landscape Value** is the value that people attach to a place based on their perception of that place.

**Natural Landscape Significance** areas contain significant landscape values based on natural characteristics.

**Values** are measures of the importance people attach to things and typically stem from perception.

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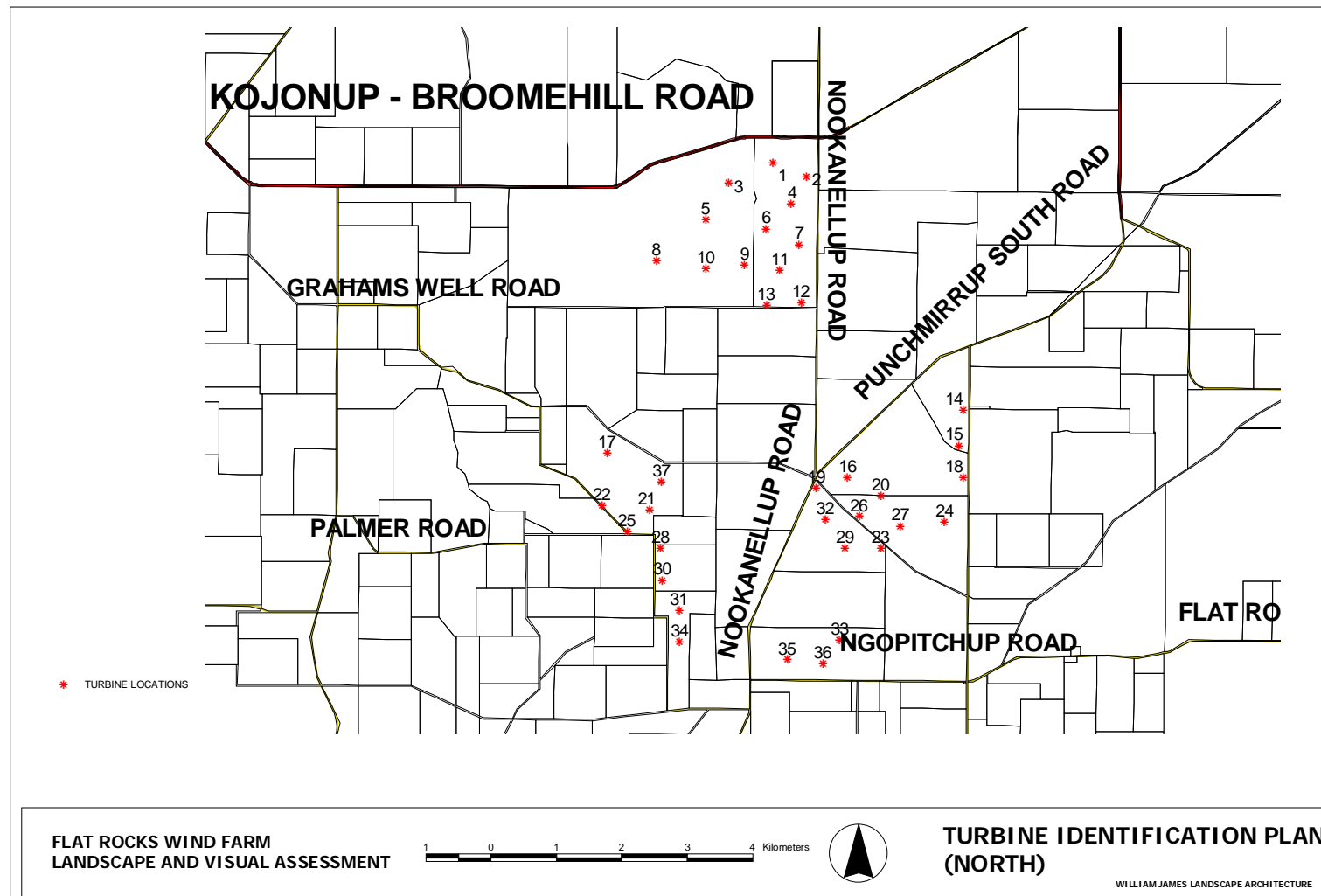


Figure 211: Turbine identification - northern sector

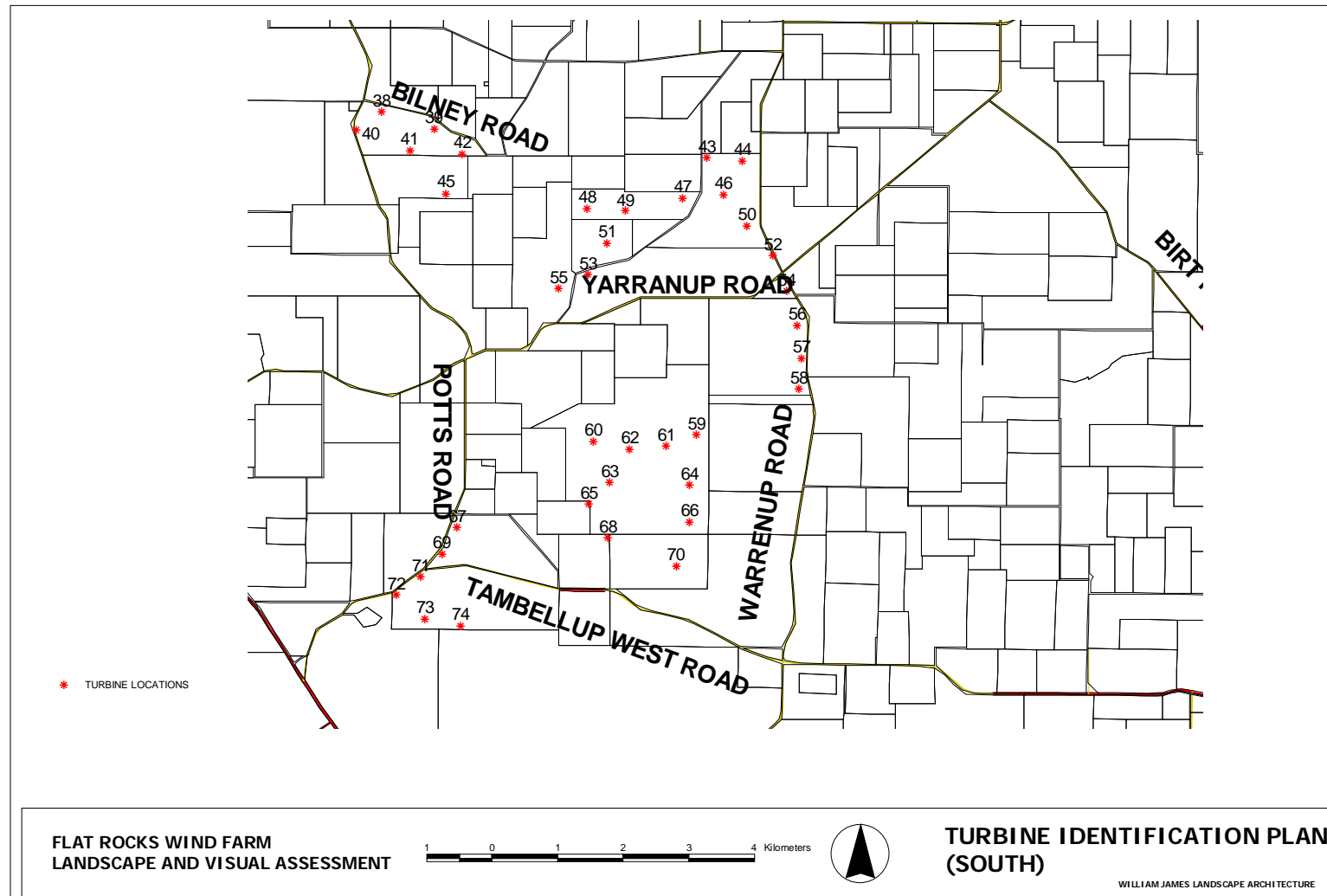


Figure 222: Turbine identification – southern sector