Mumbida Wind Farm Expansion

Infrastructure Capital Group

Development Application

RO109000-NP-RPT-0001 | 2

21 March 2019

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Client Name:	Infrastructure Capital Group
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Document history and status

Revision	Date	Description	By	Review	Approved
A	21/02/2019	Draft for internal review	K Briton-Jones	S Kelly	K Briton-Jones
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0	25/02/2019	Draft issued to Client for review	K Briton-Jones	S Kelly	H Webster
1	13/03/2019	Final DA with Client comments incorporated	K Briton-Jones	S Kelly	G Szozda
2	21/03/2019	Final DA with minor edits updated	K Briton-Jones	S Kelly	G Szozda

Contents

Executive Summary

Infrastructure Capital Group (ICG), on behalf of the owners, Australian Renewables Income Fund (ARIF), propose to construct and operate a 15 Mega Watt (MW) of solar photovoltaic array (solar array) at the existing Mumbida Wind Farm (MWF) (the Proposal). This additional infrastructure is proposed to be located within the boundary of the MWF. ICG submits this application on behalf of ARIF.

The project cost will be in the range of $25 million, a significant economic contribution to the region and will increase supply of renewable energy within WA.

Background to the Proposal

ICG, as manager and operator of MWF asset, propose to construct and operate approximately 15MW of solar array as an expansion of the existing MWF. The original MWF Planning Approval (TP09/183) (Appendix A) was determined in August 2009 by the City of Geraldton-Greenough.

The planning approval allowed for:

Electricity Generation (Wind Farm) on Lot 10284 & 6944 Burma and Connolly Roads, Walkaway & Burma.

It contained 11 conditions, a summary of those that are relevant to the Proposal are as follows:

- The MWF facilities are required to be built in accordance with the plans submitted with the DA Application, (which did not include provision for the installation of solar array nor other future development)
- No disruption to remnant vegetation present on the western side of the site is allowed

All other conditions are specific to the operation of wind turbines and address issues such as noise and aviation safety.

Key environmental and planning considerations

There is sensitive remnant vegetation on the western boundary of the MWF land however the Proposal does not impact on this vegetation. Further environmental studies have not been undertaken based on the following:

- A number of environmental studies were undertaken at the time the MWF was proposed in 2001 and 2002. These studies did not identify any fauna, flora or sensitive habitats on the area where the current Proposal is to be located. Refer to Appendix C or MWF Development Application.
- The location where the Proposal is to be sited has remained clear.
- Access to the Proposal construction site will not require further vegetation clearing for construction or maintenance activities.

Development approval is required under the City of Greater Geraldton (CGG) Local Planning Scheme No.1 (the Planning Scheme) for the proposed Solar Array (the Proposal) pursuant to the Planning Scheme Rural Zone 3.11, Table 12 Zoning table assigning a Renewable Energy Facility in the Rural Zone a symbol A. The Zoning table symbol A means:

that the use is not permitted unless the local government has exercised its discretion by granting development approval after giving notice in accordance with clause 64 of the deemed provisions.

Clause 64 of the deemed provisions in Schedule 2 of the (*Planning and Development (Local Planning Schemes) Regulations* 2015) sets out the requirements for publicly advertising applications.

While no environmental approvals were required for the original scheme, the original MWF proposal was referred to the Environmental Protection Authority (EPA) and Environment Australia (now the Commonwealth Department of Environment and Energy (DoEE) in accordance with the *Environment Protection and Biodiversity*

Conservation Act 1999 (EPBC Act). These agencies have been consulted to ascertain if a referral or approvals are required for the current Proposal and the consultation outcomes are discussed below.

Proposal Justification

Infrastructure Capital seeks development approval on the grounds that:

- The Proposal is consistent with all relevant local and state planning requirements, policies and position statements
- No community concerns have arisen during the approval of the MWF in 2009 or during its operation
- The Proposal is wholly located within the boundary of the existing MWF, which was approved without any environmental, statutory or public concerns
- The Proposal is a compatible land use to the existing MWF, surrounding solar, wind farms and agricultural activities
- The Proposal does not have any visual amenity impacts as it is located in amongst the existing MWF infrastructure with no nearby sensitive receivers.
- The Proposal is located in an area that requires no vegetation clearing and minimal disturbance for connection to the existing MWF substation and the Western Power network

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to prepare a development application to the CGG in accordance with the scope of services instructions to Jacobs from Infrastructure Capital Group.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by Infrastructure Capital Group and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs has derived the conclusions of this report from information sourced from Infrastructure Capital Group and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above; however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of Infrastructure Capital Group, and is subject to, and issued in accordance with, instructions to Jacobs from Infrastructure Capital Group.

Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

Jacobs Group (Australia) Pty Ltd have prepared this development application planning report on behalf of ICG, the proponents in this matter.

ICG propose to construct and operate a 15 Mega Watt (MW) solar photovoltaic array (solar array) at the existing Mumbida Wind Farm (MWF) (the Proposal). This additional infrastructure will be located within the boundary of the MWF. The approximate cost of the Proposal is $25 million.

ICG is a specialist independent infrastructure fund management firm who has been investing in and managing infrastructure in Australia since 2001. Infrastructure Capital have operated the MWF since 2012. In the renewable energy sector, Infrastructure Capital also manage the Bald Hills Wind Farm in Victoria and Hallett 4 Wind Farm, Hallett 2 Wind Farm and Wattle Point Wind Farm in South Australia.

This development application seeks development approval under the Planning Scheme for the 15MW solar array and ancillary infrastructure pursuant to the Rural Zone. Further, The Mid-West Wheatbelt regional Development Assessment Panel (DAP) will be the relevant decision-making authority pursuant to the *Planning and Development (Development Assessment Panels) Regulations 2011*, Regulation 5(b) which stipulates;

Mandatory DAP applications (Act s. 171A(2)(a))

Subject to regulation 4A, a development application is of a class prescribed under section 171A(2)(a) of the Act if it is for the approval of —

(a) development in the district of the City of Perth that has an estimated cost of $20 million or more; or

(b) development in a district outside of the district of the City of Perth that has an estimated cost of $10 million or more.

The Proposal is submitted to CGG as the responsible authority for DAP consideration and incorporates the following key elements:

1. Solar array
2. Switching station
3. Battery energy storage system (BESS)
4. 22kV switchgear and control room

In accordance with CGG requirements for applications for development approval, this report contains:

- Copy of the Certificate of Title
- Proposal description and site layouts
- Summary of alignment with planning policies
- Description of environmental management measures

It is supported by the following appendices:

- Appendix A: MWF Planning Approval
- Appendix B: Certificate of Title
- Appendix C: MWF Development Application
- Appendix D: Solar Array Specification

2. Subject Site and Surrounds

2.1 Locality and Land Use

The MWF is located approximately 15 km south-east of Walkaway in WA's Mid-West Wheatbelt region, as shown in Figure 1.

The region is predominantly agricultural, with various renewable energy infrastructure in the form of wind farms and solar arrays located within it. This infrastructure generates new streams of energy and income from historically grazed lands. Walkaway, being the closet small town, has approximately 264 residents (CGG 2018). Consultation with the CGG has indicated that support for renewable energy is wide amongst the community (teleconference 23 January 2019 with Jacobs, Infrastructure Capital and CGG).

There are a number of renewable energy facilities in the vicinity of the Proposal. To the north east of the Proposal is the Burma Road Nature Reserve, which has a solar array located immediately to the west of the Reserve. This solar array was approved by the Joint Development Assessment Panel for 45 MW (DAP/16/01055) and includes inverters, step up transformers, 33 kV cable and switchboard. The Walkaway Wind Farm is located approximately 5 km north of the Proposal location and has been in operation since 2004.

Approximately 1 km to the west of the Proposal site boundary, is an area of remnant vegetation, which is classified as a bushfire prone area. This is the only bushfire prone area near the Proposal. The land where the Proposal will be located is not bushfire prone for the purposes of State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7). This is discussed further in the in this application.

2.2 Subject Site

The existing MWF is located at 500 Connolly Road, Mumbida, in the Rural Zone of the CGG Planning Scheme No 1 as shown in Figure 2. The Proposal site is bound by Connolly Road, Burma Road and Allanooka Springs Road, more formally referred to as Lot 103 on Deposited Plan 71380.

The Certificate of Title for the site is contained in Appendix C. The site currently contains the fully operational MWF and associated substation and is also used for pastural grazing.

The Proposal is to be located in an area of cleared pastural land within the MWF development with the approximate land area to be used for the Proposal totalling 2.5 km^2. The Proposal can be accessed from either Connolly Road in the south, or Burma Road in the north.

2.3 Existing Development

The existing MWF was approved in 2009 under Planning Consent No TP09/183. The permit allows for *Electricity Generation (Wind Farm)* and has been operational since 2013. The site layout of the MWF is shown in Figure 3. The MWF is connected to the Western Power Network via the MWF Substation. Images of the site location are depicted in Plate 1 through to Plate 7.

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Mumbida Wind Farm Expansion, Development Application

Locality Map

Legend

Proposed Site Boundary

Esri, Garmin, GEBCO, NOAA NGDC, and other contributors, Landgate / SLIP

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Kilometres

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Figure 1 Location Plan showing the Mumbida Wind Farm Expansion

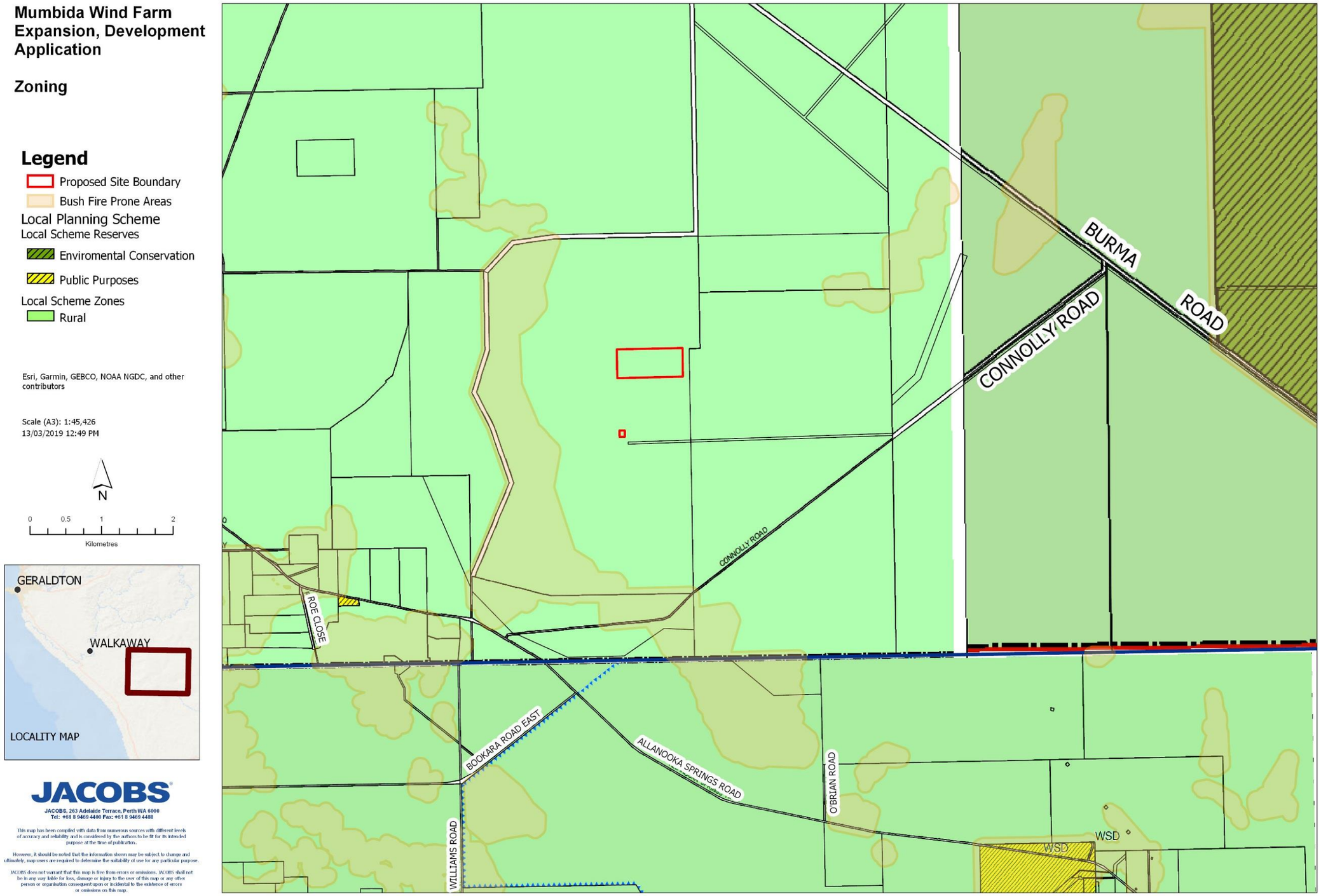


Figure 2 Mumbida Wind Farm Expansion Zone Plan

Mumbida Wind Farm Expansion, Development Application

Current Site Layout

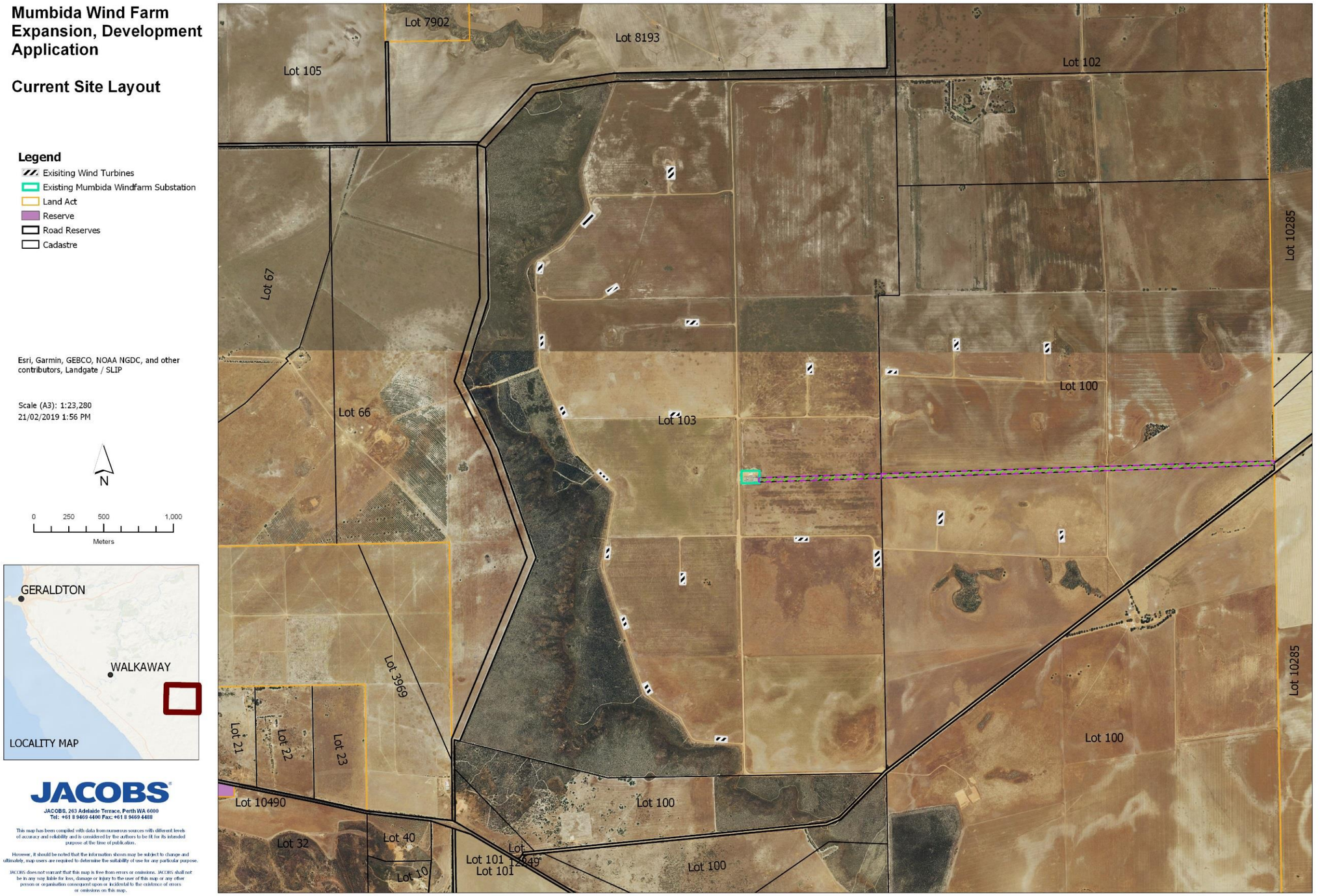


Figure 3 Existing Mumbida Wind Farm Site Layout

Plate 1 Access to Substation from Connolly Road

Plate 2 Wind farm access road from Substation to Proposal location looking north

Plate 3 Substation area looking east

Plate 4 Substation area looking west

Plate 5 Mumbida Wind Farm looking north

Plate 6 Mumbida Wind Farm looking east

Plate 7 Mumbida Wind Farm looking south

2.4 Existing Environment

Jacobs reviewed relevant environmental studies that were conducted for the site at the time the MWF was proposed (2001 and 2002). These studies have not identified any fauna, flora or sensitive habitats on the Proposal site. Further details on these reports is provided with Appendix C in the MWF development application.

In addition, a description of the existing amenity of the Proposal location and surrounds is provided.

Biota Environmental Sciences, Mumbida Wind Farm, Vertebrate Fauna Desktop Review, April 2002

Biota Environmental Sciences conducted a fauna survey of the entire MWF site in 2002, including where the Proposal is located, and subsequently produced the 'Proposed Mumbida Wind Farm – Vertebrate Fauna Desktop Review'. This report was submitted with the MWF Development Application and provides an overview of the existing avifauna and bats that may occur over the entire MWF site.

The desktop review indicated that a total of 34 bird species were recorded at the site and an additional 78 may occur. Whilst most of these birds are common to WA, there were a number listed under the Japan-Australia Migratory Bird Agreement and China-Australia Migratory Bird Agreement. The results also showed that there are three species of bat in the area with five additional species likely to occur in the vicinity.

Further survey was not conducted as it was considered unlikely the Proposal would have any impact to fauna beyond what was identified in the 2002 study.

Biota Environmental Sciences, Mumbida Wind Farm, Western Power Flora and Vegetation Survey, January 2001

In 2001, Biota Environmental Sciences undertook a flora and vegetation assessment for the original MWF proposal along the area of remnant native vegetation on the western boundary of the property.

This survey identified 207 species, 17 of which were introduced species, as being present within this vegetation. One Declared Rare Flora (DRF) and 8 Priority Flora species were also recorded, as listed below:

- *Leucopogon marginatus (DRF)*
- *Stylidium pseudocaespitosum (Priority 1)*
- *Eremaea acutifolia (Priority 2)*
- *Baeckea ep. Walkaway (Priority 3)*
- *Grevillea erinacea (Priority 3)*
- *Grevillea hirtella (Priority 3)*
- *Hakea polyanthema (Priority 3)*
- *Banksia scarbrella (Priority 4)*
- *Stachystemon axillaris (Priority 4)*

The report stated that "the high number of threatened flora recorded at Mumbida reflects the sparsity of vegetation left in the region, the specialised 'breakaway' habitat and the naturally high level of speciation and relictual flora present in the sandplain communities." The report also stated that the conservation significance of the 'breakaway' vegetation at MWF is extremely high.

The report made three recommendations:

1. Consider placing wind turbines in cleared farmland

2. Any vegetation that is disturbed should be subject to a thorough survey targeted specifically at DRF and Priority Flora

3. Management guidelines need to be developed to prevent the introduction of weeds and diseases and to minimise soil disturbance and fires

These statements are relevant to the Proposal which is to be located on cleared pastural land and does not propose any vegetation clearance. During the detailed design and contract award phase a construction management plan will be developed to address the risk of introduction of weeds and diseases and to minimise soil disturbance and fires.

Landscape and Visual Amenity

The landscape where the Proposal is to be located is a largely flat (refer Plate 4), rural agricultural area surrounded by quilted patterned parcels of land, the undulating hills of the remnant vegetation to the east and the existing wind farm. The Proposal site and surrounds are not considered to be highly sensitive to a change such as the addition of the Proposal.

During the development application for the original MWF a Visual Landscape Evaluation and Impact Assessment was conducted. This identified that the project will not have a significant visual impact as it will not significantly change the visual character of the area. The Proposal will be located within the bounds of the MWF and no new sensitive receivers (either rural residential properties or other sensitive land uses) have been identified since the MWF was approved. It is considered that the Proposal will therefore not have an impact to the landscape or visual amenity.

Plate 8 Panoramic view from near central location of Proposal

3. Stakeholder Engagement

Combined with the development of this development application and review of legislation, three stakeholders were identified that were considered imperative to the assessment process of the Proposal. Community stakeholders were not considered to be opposed to the development and therefore the consultation was focused on the regulators as discussed below.

City of Greater Geraldton

Jacobs and Infrastructure Capital held a pre-lodgement conference with Councils Planning and Development Manager on the 23 January 2019 to discuss the Proposal.

During this teleconference, Council advised that existing renewable energy developments within the CGG have not been subject to community complaint and the community is generally supportive of renewable energy development. In addition, CGG confirmed the planning requirements for the Proposal and specific planning issues that should be assessed in the development approval application. This report seeks to address each of the issues that CGG recommended and assesses the Proposal against all relevant planning requirements.

Environmental Protection Authority

The original MWF proposal was referred to the EPA to ensure all potential environmental approvals necessary for the project had been assessed. The referral concluded that the project did not require assessment (i.e Not Assessed).

In keeping with this approach, Jacobs consulted with the EPA (email correspondence; K. Briton-Jones, 8 February 2019) to identify whether the Proposal would need to be referred.

General advice from the EPA concluded that where a relevant authority deems that if initiated, a project has the potential to have a significant environmental impact that proposal should be referred to the EPA. As discussed in this report, the Proposal will not have any impacts that have potential to cause significant impact to the environment. Therefore, the Proposal is not planned to be referred to the EPA.

Commonwealth Department of Environment and Energy

In 2009, the original MWF proponent (Verve Energy) submitted a referral to the DoEE for the original MWF under the EPBC Act. At that time, the DoEE determined that the project was not a ‘controlled action’.

Jacobs consulted with the DoEE (email correspondence; K.Briton-Jones, 8 February 2019) as to whether a referral was required to be made. Based on the Proposal factors described in this report (i.e. no native vegetation clearing, no significant environmental impact) it is unlikely that the Proposal would impact a Matter of National Environmental Significance (MNES).

The DoEE advised that where there would be no impact on MNES, no referral and therefore potential for approval would be required under the EPBC Act.

4. Description of Proposed Development

4.1 Proposed Layout and Key Components

The Proposal comprises the construction and operation of a 15 MW solar array at the MWF. The Proposal will contain the following key components:

1. Solar array
2. Switching station
3. Battery energy storage system (BESS)
4. Solar array operation and maintenance office

It is expected that the solar array and associated infrastructure will be built to specifications typical for solar array and as such may have the following specifications:

1. Solar array: approximately 400 m long, 675 m wide and 3.5 m high (from ground level)
2. Switching station: 22kV and within a transportable building 12.5 m long, 2.5 m wide and 2.6 m high
3. BESS: contained within 10 standard shipping containers 12.5 m long, 2.5 m wide and 2.6 m high

These specifications will be confirmed during the detailed design phase, if the dimensions of the infrastructure is substantially different to those mentioned above an amendment to the development approval will be sought.

The indicative layout of the site is shown in Figure 5. The life expectancy of the Proposal is approximately 35 years. The Proposal has a cost in the order of $25m.

Further information about the various components is provided below.

Solar Array

The proposed solar array will include installation of the solar array, inverters and underground cabling to the existing MWF 22 kV switch room. The proposed panels will be single axis tracking, located approximately 1-2 m above the ground (refer expected specification in Appendix D). The solar array rows will run north south so that the panels can track from east to west during the day.

While the Proposal does not require vegetation clearing, minor earthworks will be required to prepare the foundations of the solar array.

Battery Energy Storage System

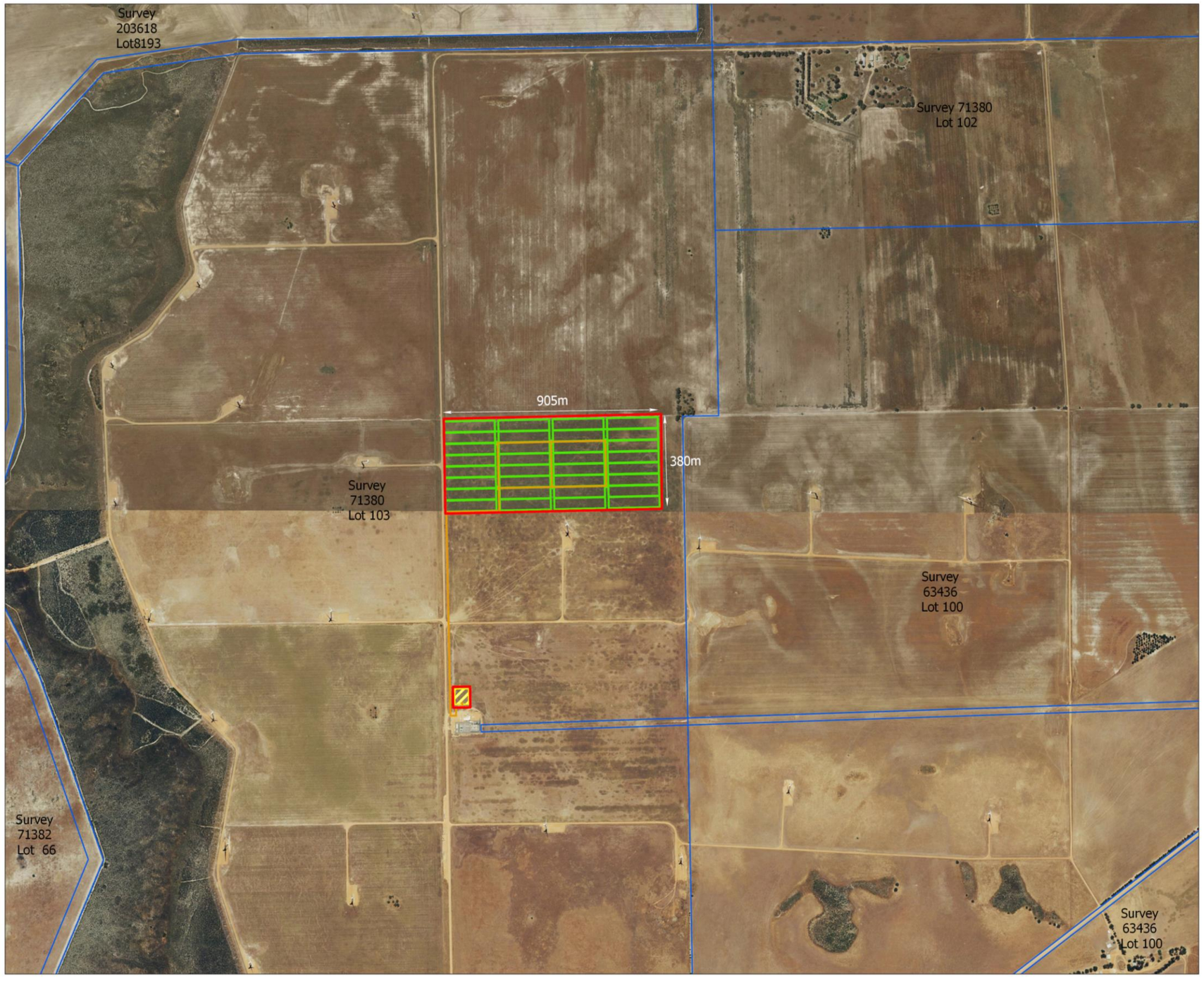
The BESS will be premanufactured and shipped in 40 ft shipping containers. The Proposal will require approximately 10 shipping containers and these will be located side by side with access provided around the full perimeter of each container. The switchgear and control room will be comprised of a transportable building also located in the BESS area.

An example of the BESS layout (although smaller than this Proposal and connected to 33 kV instead of 22 kV) is provided in Figure 4 below:

Figure 4 Example Battery Energy Storage System Layout, source: AES (Australian Energy Storage) Conference 2018

Mumbida Wind Farm Expansion, Development Application

Proposed Site Layout



Legend

- Proposed Site Boundary
- Cadastre

Proposed Infrastructure

- Battery Energy Storage Systems
- Solar Array
- Proposed 22kV Cable

Esri, Garmin, GEBCO, NOAA NGDC, and other contributors, Landgate / SLIP

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Figure 5 Proposed Site Layout

4.2 Construction Phase

The Proposal will be built in one stage over approximately 12 months, with construction anticipated to start quarter 3 of 2019, pending development approval.

During construction, additional vehicles, construction equipment and construction personal will be on site. All access is expected to stay within already developed areas of the MWF and no additional access roads or clearing of vegetation is required. Existing roads proposed to be used are depicted below in Plate 9.

A construction laydown area is proposed within the existing cleared substation area. This area will be used for storage of construction equipment and include bunded areas for fuels and chemicals, portable amenities and car parking facilities. All accommodation for construction staff will be located off-site.

During construction there will be approximately 100 vehicles per week visiting the site. The peak construction period is anticipated to require up to 100 personnel, with a likely average of 50 people throughout the construction process.

4.3 Operational Phase

Operational hours are expected to be the same as the existing MWF which is 7 am to 5 pm Monday-Friday and as required to maintain plant reliability. Operation of the solar array will require one additional operational staff member to join the existing MWF operational staff.

During operation, vehicle traffic to the site will comprise of approximately two vehicles per day.

The facility will have a security fence and a fire break buffer of approximately 5 m wide around the perimeter of the solar array.

4.4 Decommissioning

All above ground equipment to be removed at the end of the Proposal's life expectancy, which is approximately 35 years. All infrastructure is expected to either be recycled or disposed of in a responsible manner. Decommissioned areas will be rehabilitated as appropriate.

Plate 9 Existing access road to substation and Proposal location looking south

5. Statutory Requirements

5.1 Planning and Development Act 2005

The Proposal is located within the Rural Zone, where the development of renewable energy is permissible subject to third party notice being undertaken, as required by Clause 64 of the deemed provisions in Schedule 2 of the *Planning and Development (Local Planning Schemes) Regulations* 2015

In accordance with the Development Assessment Panels Regulations 2011, Regulation 5(b) this Proposal is a Mandatory DAP application, as it is for a development in a district outside of the City of Perth with an estimated cost over $10 m, and therefore will be referred to the Joint Development Assessment Panel (JDAP) as the relevant authority.

The application must be lodged with CGG, who will initially assess the development application contents and then refer the application to the JDAP. Within 7 days after receiving the DAP application, the CGG must give the relevant DAP administration a copy of the application, the public notice given, confirmation that fees have been paid and any other notice given to the applicant. The CGG must prepare a planning assessment report to the DAP within 78 days after the date on which the application was made, as per clause 12(3)(c), however while the DAP must have regard to the planning report, it is not bound to give effect to, the recommendations and if there is no report the DAP may still determine the DAP application (as per Clause 12(6) and 12(7)).

There are no scheduled times for the JDAP hearings and anyone can make a submission against or for the Proposal, however there are no appeal rights for the representations. The DAP will notify the applicant once a meeting has been scheduled to consider the application.

5.2 Environmental Approvals

5.2.1 Part IV of the Environmental Protection Act 1986

Part IV of the *Environmental Protection Act* 1986 (EP Act) relates to the environmental assessment of 'significant proposals'. The EP Act defines 'significant proposals' as those that are likely to have, if implemented, a significant impact on the environment. Significant proposals are required to be referred to the EPA under Section 38 of the EP Act. Consultation with the EPA regarding this proposal is discussed earlier in Section 3.

The MWF was referred to the EPA in 2002 and 2009, the EPA resolved to informally assess the proposal on the basis that the likely environmental impacts were not likely to be significant and therefore did not require formal environmental assessment. The EPA recommendations stated that the impacts from the wind farm could be managed with appropriate development approval conditions, including noise impacts and no clearing of remnant vegetation to the west of the wind farm.

Given the Proposal does not involve significant clearing, will not impact threatened ecological communities, will not impact threatened flora, is not located within flight paths of significant bird species and does not involve solar towers, it is considered that it does not have potential to significantly impact the environment.

5.2.2 Part V of the EP Act

Part V of the EP Act requires the following:

- Operators of premises that are prescribed under Schedule 1 of the *Environmental Protection Regulations* 1987 are required to obtain a works approval to construct and a licence or registration to operate the premises.
- Clearing of native vegetation is required to be done in accordance with the Native Vegetation Clearing Permit (NCVP) unless otherwise stated in the EP Act or *Environmental Protection (Vegetation Clearing) Regulations* 2004.

The Proposal has been assessed against Part V of the EP Act and for the following reasons, it is considered that no further environmental approvals are required under this section of the Act:

- Solar arrays are not listed as a prescribed premise under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) and therefore Works Approval, Licence and/or Registration is not required.
- Operation of solar arrays will not generate noise. Note: construction noise will need to be assessed against the *Environmental Protection (Noise) Regulations* 1997 to ensure construction activities remain within the prescribed noise levels.
- No clearing of native vegetation is proposed, therefore, a NCVP is not required in accordance with *Environmental Protection (Vegetation Clearing) Regulations* 2004.

5.2.3 Rights in Water and Irrigation Act 1914

There is currently no application to take water under Section 5C of the *Rights in Water and Irrigation Act* 1914 (WA).

However, pending development approval, a licence will be sought for dust suppression for earthworks, general and road construction purposes. The approximate volume required to be abstracted for construction purposes will be determined during the detailed design phase.

5.2.4 Aboriginal Heritage Act 1972

A search of the Aboriginal Heritage Inquiry System has been undertaken and no Aboriginal heritage sites have been identified on the Proposal site.

However, if Aboriginal heritage sites are discovered at any time during construction, works will cease and appropriate approvals will be obtained under the *Aboriginal Heritage Act 1972*.

5.2.5 Environment Protection and Biodiversity Act 1999

The EPBC Act is the Commonwealth Government's central piece of environmental legislation and is administered by the DoEE. The EPBC Act provides a framework to protect and manage national and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance.

It is a requirement of the EPBC Act that any action that has, will have or is likely to have a significant impact on MNES, must not be undertaken without being referred to DoEE for assessment. The DoEE assesses the proposal to determine whether it constitutes a 'controlled action'. If the Proposal is deemed a 'controlled action', implementation will consequently be subject to an approval from the Minister for the Environment.

The MWF was referred to the DoEE in 2009 and stated that two species of listed fauna may have existed in the area; Carnaby's black cockatoo (*Calyptorhynchus latirostris*) and malleefowl (*Leipoa ocellata*), which (at the time) were listed as threatened and vulnerable, respectively.

The referral also identified one endangered flora species *Leucopogon marginatus*, which was identified to occur in the remnant vegetation to the west of the MWF site. The referral stated that no remnant vegetation clearing was proposed and operation of the wind farm and fencing was to be repaired/replaced and maintained to protect the integrity of the remnant vegetation and the endangered flora species.

It was determined that wind farm proposal was not a controlled action and did not require further assessment by the DoEE.

Although the Proposal was not part of the 2009 referral, the Proposal does not include any aspects that may have significant impacts to MNES beyond those assessed in the 2009 referral. Furthermore, desktop analysis of the Proposal against the requirements of the EPBC Act show that referral of the Proposal is not required. Consultation with the DoEE (refer Section 3) was also undertaken to support this conclusion.

6. Environmental Management

The following sections describe the potential environmental impacts of the Proposal, where applicable, describes the proposed mitigation measures.

The Department of Planning, Lands and Heritage (DLPH) renewable energy facilities position statement states:

> *"Key matters during the construction phase are:*
>
> - *a site construction management plan that identifies standards and procedures for the construction of the development including the management of environmental emissions such as dust and noise;*
> - *site disturbance should be minimised during construction through careful siting and measures to address erosion, drainage run-off, flooding, water quality, retention of remnant vegetation, stabilisation of top soil, and weed and disease hygiene; and*
> - *vehicle and machinery access and movement*".

A construction management plan will be developed during the construction phase of the Proposal which addresses these matters. Furthermore, commitments made about environmental management in the original MWF development approval application and referrals will continue to be implemented. Specifically:

- Clearing of remnant vegetation is avoided
- Management measures are put in place to manage weeds, disease, soil disturbance and fires.

It is noted that Clause 4.7 of the Planning Scheme (environmental conditions) does not have any environmental conditions applicable to the subject site, or in the neighbouring surrounds.

6.1 Flora and Fauna

The Proposal is located on land that has been previously cleared and used for grazing since before the original MWF was constructed (refer Plate 10). The remnant vegetation identified in the original MWF Development Application will continue to be retained and there are no planned impacts from the Proposal on this area.

The Biota desktop study (refer previous section 2.4) concluded that no ground dwelling fauna would be impacted by the original MWF proposal as the wind farm was proposed to be sited in open pasture.

Although the Biota report focused on the impacts that a wind farm would have, statements about the vegetation, fauna and other sensitive habitats are relevant to the Proposal. This is on the basis that the Proposal will be located within the boundary of the existing wind farm in a flat, open grazed area, where no vegetation clearing is proposed.

Management of introduced weed species will be managed on site during the construction by standard weed hygiene practices, such as requiring ensuring all earthmoving equipment to be free of organic matter before arriving on site.

Plate 10 Proposal location looking south-east

6.2 Visual Amenity

The Proposal is located approximately 3 km from Connelly Road and nearly 5 km from Burma Road, the two closest ‘main’ roads.

The Proposal is unlikely to obstruct landscape views from either of these roads because of the low scale of the infrastructure to be developed, especially when considered against the larger infrastructure associated with the MWF (as depicted in Plate 11). Therefore, the Proposal is not expected to have an impact to visual amenity.

Plate 11 Panoramic views near central location of Proposal looking south

6.3 Air Quality

Construction

Impacts to air quality that may arise during construction are related to the generation of dust.

This has very low potential to deposit on vegetation in the nearby 'breakaway' remnant vegetation strip to the west of the Proposal. While the construction methodology is yet to be determined, on site measures during construction will need to ensure that any residual dust impacts to this vegetation community will be remediated. Mitigation measures will be contained within the construction management plan and may include wetting the construction area during earthworks, sediment fences and monitoring forecast wind levels.

Through the implementation of standard environmental management controls (e.g. use of water trucks for dust suppression, use of properly maintained equipment), construction air quality impacts at sensitive receivers (remnant vegetation to the west) are expected to be negligible.

Operation

The generation of solar energy during the operation of the Proposal would not generate any emissions or affect air quality. During operation, the project would have a positive impact on emissions to air by reducing Australia's reliance on fossil fuels for electricity generation.

Annual maintenance activities would result in some localised, intermittent vehicle emissions and potentially some generation of dust from vehicles travelling across the access tracks, however the impact on local and regional air quality are expected to be negligible.

6.4 Bushfire Management

The Proposal is not located in an area identified as bushfire prone, therefore SPP 3.7 does not apply. However, the existing MWF does have a Fire Management Plan and this will continue to be implemented during construction and operation of the Proposal.

6.5 Aboriginal and Non-Aboriginal Heritage

No known heritage sites are located on the Proposal site. However, if heritage sites are discovered during construction, work will cease and the appropriate authorities will be notified.

6.6 Surface Water and Drainage

Construction

Stormwater run-off, erosion and sediment control will be managed on site during construction in accordance with the CGG stormwater requirements. Furthermore, the site-specific construction management plan will contain stormwater management requirements.

Operation

During operations stormwater run-off may be generated from the solar arrays.

If necessary, drainage will be designed and constructed within areas affected by the development to ensure that there is no increase in flow intensity or frequency beyond the site boundaries.

The key principles for stormwater management for the Proposal are as follows:

- Collected surface water runoff will be discharged to match existing drainage patterns as much as possible.
- The BESS area will include design and management features to enable the effective management of potential contaminants within stormwater, including appropriate bunding and presence of spill containment kits on site.
- All drainage works will be designed and constructed to prevent scour and erosion. Additional protection measures will be included as required at locations particularly susceptible to scour/erosion.
- All drainage works will be formed to provide a consistent fall along drainage lines and to avoid flat spots, where water may be subject to collection adjacent to the Proposal infrastructure.
- Areas beneath the solar arrays will remain permeable to allow stormwater run-off to continue to have the same stormwater characteristics as before the solar arrays were installed.

7. Planning Assessment

This section assesses the Proposal against the Planning Scheme, Local Planning Policies, State Planning Policies, State Planning Strategies and relevant State position papers

7.1 Local Planning Requirements

7.1.1 City of Greater Geraldton Local Planning Scheme No.1

The Planning Scheme sets out the controls and guiding principles for proposed development to support and enhance the local government area. This section assesses the Proposal against the land use zoning and general development requirements of the Planning Scheme.

Rural Zone

The Proposal is located within the rural zone, of the Planning Scheme. The Objectives of the rural zone that are relevant to the Proposal provide for developments that support and protect the specific local character of agricultural and pastural activities from incompatible land uses, while providing for a range of beneficial non-rural land uses, such as renewable energy facilities. The Proposal is considered to be compatible with the rural zone objectives given it is a renewable energy facility and supports the existing wind farm while simultaneously allowing pastural activities to co-exist on the surrounding land.

The site and development requirements applicable to the rural zone, and specifically those that are relevant to the Proposal are largely associated with local government having regard to the agricultural and economic viability of the land and potential for mineral or extractive resources in the area. The Proposal is consistent with this as it seeks to harness the economic viability of the land owing to the flat topography and high solar resources essential for the solar power generation.

In accordance with the Planning Scheme's zoning table, a renewable energy facility is categorised as an 'A' land use, meaning that the use is not permitted unless the local government has exercised its discretion by granting development approval after giving notice in accordance with the Planning Scheme.

Part 4 – General Development Requirements

The following general development requirements are applicable to the Proposal:

- Clause 4.14 Parking Requirements: A renewable energy facility is not a specified class and therefore the local government is required to have regard to the nature of the Proposed development, car parking requirements for that use and any impacts on the adjoining land use. Given the low number of employees (1) and infrequent number of visitors / clients, parking requirements are anticipated to be minimal and if necessary can easily be accommodated by existing car parking onsite or during detailed design given the large open area available on the property.
- Clause 4.20 Landscaping: No landscaping of the Proposal is proposed. The solar array will be entirely fenced on what is currently a flat open grass area used for grazing purposes.

7.2 Local Planning Policy

In making a determination under the Planning Scheme, the relevant authority must also have regard to each relevant local planning policy to the extent that the policy is consistent with the Planning Scheme. The following subsections outline the relevant local planning policies and how the Proposal relates to these.

7.2.1 Shipping Containers Local Planning Policy (2015)

The Shipping Containers LPP is relevant to the Proposal as it relates to the use of shipping containers as an outbuilding ancillary to the approved use of the land. The Proposal includes the BESS which will be built inside a series of approximately 10 shipping containers each expected to be 2.5 m high, 2.6 m wide and 12 m long

(although exact specifications will be confirmed during detailed design). The Shipping Containers LPP Measure 3.5 states:

"*Other than on industrial land no more than 1 shipping container is permitted and shall not exceed 6m in length, 2.4m in width and 2.6m in height.*".

Where proposals do not meet Measure 3.5 the Shipping Container LPP states that the proposal shall not result in a detrimental impact on the amenity of the land or adjoining land or development, impinge on boundary setbacks, be visually prominent from any public road or compromise or obstruct any associated approved development including carparking, existing access or by being located in a service yard or storage area.

Although the proposal may require 10 shipping containers, it will meet the requirements of the Shipping Container LPP as they will be well set back from public roads and is compatible with the nature of the existing development of electricity generation on the site. The visual amenity is not compromised as the site is not a widely accessible location and there are no sensitive receiver views to the Proposal location where the shipping containers will be located.

7.2.2 Stormwater Drainage Disposal requirements (DE08) Information Sheet

The requirements for commercial and industrial developments apply to the Proposal in that there will be flat permeable area once the solar array is built.

The BESS component will likely be impervious, however this layout will be designed over a gravel base with a suitable retention basin. The approximate retention basin design has not been prepared at this stage, however will be incorporated to meet the CGG requirements during the detailed design stage.

7.3 Strategic Planning Documents

7.3.1 City of Greater Geraldton Local Planning Strategy, 2015

The CGG Local Planning Strategy 2015 (the Strategy) is an important document as it forms the basis for the preparation of the Planning Scheme and all developments done in accordance with the Planning Scheme should also be consistent with the Strategy.

The Strategy specifically acknowledges that the rural land of CGG supports a range of land uses, including renewable energy including the Alinta Wind Farm, MWF and Greenough River Solar Farm. This sector has also been recognised for its contribution to the region in the Greater Geraldton Economic Development Strategy (2013-2023). Of relevance is the emphasis within the Strategy on protecting local biodiversity.

As the Proposal is specifically related to the continued operation of the MWF, provides continued economic use of rural land and does not propose to impact biodiversity, the Proposal is consistent with the Strategy.

7.4 State Planning Policies

7.4.1 State Planning Policy 2.5 Rural Planning, 2016

State Planning Policy 2.5 Rural Planning 2016 (SPP 2.5) aims to protect rural land in WA from incompatible development. SPP 2.5 is relevant to the Proposal as it is located on rural zoned land and is not specifically provided for as a 'P' activity on this land.

SPP 2.5 does not specifically advocate for renewable energy however, it does encourage rural land to remain un-subdivided and for priority agricultural land to continue to be used for agricultural purposes.

The Proposal is consistent with SPP 2.5 as it does not seek to subdivide the land, is not located on priority agricultural land and the location of the Proposal in relation to the existing wind farm allows it to maximise the rural land already used for renewable energy purposes.

7.4.2 State Planning Policy 3.7 Planning in Bushfire Prone Areas

SPP 3.7 sets out requirements for developments located within bushfire prone areas. The Proposal is located outside a bushfire prone area, with the nearest bushfire prone area being approximately 1 km from the site. Therefore SPP 3.7 does not apply.

It is relevant to note that standard fire and emergency management will be in place at the Proposal, including a 5 m fire break around the solar array, and the existing MWF Fire Management Plan will continue to be implemented.

7.4.3 DLPH Draft Position Statement Renewable Energy Facilities May 2018

The Draft Position Statement Renewable Energy Facilities, 2018 (the draft position statement) outlines objectives for those assessing renewable energy proposals, and proponents of these developments. The paper prefaces the objectives by stating:

> "*Renewable energy can enhance local economies and easily connect into the network grid. The contribution that renewable energy facilities make to the reduction in carbon emissions is an important consideration for the growth of the industry*."

The objectives largely focus on addressing the key planning and environmental considerations for location, siting and design of renewable energy facilities, minimising environmental impact and encouraging public engagement in the planning process.

The Proposal is consistent with the draft position statement as it is largely consistent with existing local and state planning requirements, will not have significant environmental impacts and maximises the use of the existing MWF site. Furthermore, the Proposal will increase the contribution that the MWF makes to the local economy and WA's use of renewable energy.

8. Conclusion

The Proposal is an appropriate use of the existing MWF site - it is consistent with local and state planning requirements, maximises the use of the MWF site and contributes to the local economy and WA's use of renewable energy.

The Proposal site is considered an appropriate location to allow for nearby connection to existing electricity infrastructure, compatible zoning and capacity within the network to accept additional generation. Although the use is not a 'P' activity within the rural zone, it is considered the most appropriate use of the site in the context of the existing MWF.

The development of electricity infrastructure is a positive contribution to meeting the electricity requirements of the mid-west region and the state of WA. It will also have positive socio-economic contribution to the communities in the CGG. The development of the renewable energy facility will contribute to reducing greenhouse gas emissions and aligns with various National and State strategic targets and policies.

It is considered that the Proposal exhibits substantial planning merit and accords with the intention for the locality outlined in the Local Planning Scheme, specifically:

- The MWF expansion is proposed to be sited adjacent to existing electricity infrastructure;
- The location of the Proposal provides optimal opportunity for the Proposal to utilise the region's natural solar resources for the efficient generation of renewable energy;
- The Proposal will not have significant visual, noise or dust impacts.
- The Proposal is anticipated to have minimal to no environmental impacts;
- The Proposal site is not considered to support areas of high-quality native vegetation, and no State or Nationally listed threatened species have been identified at the site. There will be no impacts to native vegetation.
- No registered places of heritage significance are located on the Proposal site, nor anticipated to be impacted by the Proposal.

Consequently, the proposed development is not at variance with the overall intent of the Planning Scheme and merits Development Approval.

References

City of Greater Geraldton, Local Planning Strategy viewed 20/02/2019 via: https://www.cgg.wa.gov.au/Profiles/cgg/Assets/ClientData/Document-Centre/Planning/Strategic_Document/Local_Planning_Strategy.pdf

Clean Energy Council Renewable Energy Target, viewed 21/02/2019 via: https://www.cleanenergycouncil.org.au/advocacy-initiatives/renewable-energy-target

Planning and Development (Local Planning Schemes) Regulations 2015, viewed 21/1/2019 via: https://www.dplh.wa.gov.au/getmedia/6e4785e3-d40f-45cd-95e8-85d3115ee32e/PD_LPS_Deemed_Provisions

Planning and Development (Development Assessment Panels) Regulations 2011 viewed 27/02/2019 via: https://www.legislation.wa.gov.au/legislation/prod/filestore.nsf/FileURL/mrdoc_32245.pdf/$FILE/Planning%20and%20Development%20(Development%20Assessment%20Panels)%20Regulations%202011%20-%20%5B00-h0-00%5D.pdf?OpenElement

Western Australia Planning Commission, Planning Bulletin 100, State Planning Policy 3.6 Development Contributions for Infrastructure, November 2009, viewed 21/1/2019 via: https://www.dplh.wa.gov.au/getmedia/304cb201-2954-4d87-8073-d44b9702c9dd/PB_100_SPP3-6_development_contributions_infrastructure

Western Australia Planning Commission, Draft Position Statement: Renewable energy facilities, May 2018 viewed 25/01/2019 via: https://www.dplh.wa.gov.au/getmedia/1dbcab15-51b3-4fc6-8f9a-f831af3b5fe5/POS-Draft_PS_Renewable_Energy_Facilities_May2018

Western Australia Planning Commission, Guidelines for Planning in Bushfire Prone Areas, Version 1.3 December 2017, viewed 11/02/2019 via: https://www.dplh.wa.gov.au/getmedia/a60c819d-eedf-4518-9817-a6e27e7a671c/GD-BF-Bushfire_Guidelines_Version_1-3_Dec2017

Western Australia Planning Commission, State Planning Policy 3.7; Planning in Bushfire Prone Areas, December 2015, viewed 11/02/2019 via: https://www.dplh.wa.gov.au/getmedia/1d43999e-f3da-4f45-bfaf-e34ff16cee6c/SPP-3-7_BF-Planning_in_Bushfire_Prone_Areas

Appendix A. Mumbida Wind Farm Planning Approval

City of Geraldton-Greenough
Climate of Opportunity

Our Ref: A63245 & A63172 & TP09/183
Enquiries: Karrie Elder

26 August 2009

Verve Energy
GPO Box F366
PERTH WA 6841

Attention: Mr Daniel Thompson
Manager Sustainable Development

Dear Sir

PROPOSED ELECTRICITY GENERATION (WIND FARM) ON LOT 10284 & 6944 BURMA AND CONNOLLY ROADS, WALKAWAY & BURMA

Council, at its ordinary meeting held on 25 August 2009, considered the above application and resolved to grant Planning Approval as per the attached Determination on Application for Planning Approval No: TP09/183.

PLEASE NOTE: This Planning Approval DOES NOT constitute a building licence, for which a separate application must be made to the City. If you have a building licence application lodged with the City it is your responsibility to ensure the plans approved with this planning application correspond with the submitted building licence application. You must not commence development until you have obtained a building licence, together with any additional approval which may be required from other Government Agencies under separate legislation. It is your responsibility to obtain any additional approvals required before the development/use can lawfully commence.

All of the conditions of the enclosed Planning Approval are to be substantially complied with to the approval of the City PRIOR to the commencement of use of the development. In this regard you should contact the City's Town Planning Department at least 7 days prior to your intended date of commencement to arrange a final inspection.

Should you have any queries or require any further information, please do not hesitate to the City's Town Planning Services on (08) 9956 6900.

Yours faithfully,

MURRAY CONNELL
Manager Town Planning Services

Cathedral Avenue Geraldton WA 6530 Tel 9956 6600 Fax 9956 6674
Cnr Edward / Geraldton / Mt Magnet Road Utakarra WA 6530 Tel 9921 0500
PO Box 101 Geraldton WA 6531 ABN 56 641 867 188
General Email council@cgg.wa.gov.au www.cgg.wa.gov.au

City of Geraldton-Greenough
Climate of Opportunity

Approval No: TP09/183

DETERMINATION ON APPLICATION FOR PLANNING APPROVAL

Planning and Development Act 2005

Town Planning Scheme No. 4 (Greenough) – Appendix VI

Proponent: **Verve Energy**

Lot/Location No: **10284 & 6944**

Street Name: **Burma & Connolly Roads** Locality/Suburb: **Walkaway/Burma**

Application date: **26 June 2009** Received on: **26 June 2009**

Description of proposed development/land use: **Electricity Generation (Wind Farm)**

Date of Determination: **25 August 2009**

The application for planning approval is GRANTED subject to the following conditions:

1. Development shall be in general accordance with the attached approved plan(s) received 26 June 2009 and subject to any modifications required as a consequence of any condition(s) of this approval. The endorsed plans shall not be modified or altered beyond the Wind Farm area without the prior written approval of the local government.

2. The submission of detailed building plans and the issue of a Building Licence for each of the proposed Wind Turbines and associated buildings or facilities to the approval of the local government prior to commencement of any development on the site.

3. Before the development/land use is commenced, the proponent is responsible to ensure that a Traffic Management Plan is lodged with both the local government and Main Roads WA for their approval, and is approved by the local government and Main Roads WA setting out in detail the management commitments applicable to traffic relevant to all installations, activities and processes. The Traffic Management Plan shall include the identification of necessary road upgrading in consultation with the local government and Main Roads WA and the provision of a dilapidation survey prior to and at the completion of the development with any damage caused to the road network used by transport vehicles accessing the site to be repaired to the approval of the local government and Main Roads WA. Once approved, the proponent from time to time is responsible to ensure, that all installations, activities and processes carried

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City of Geraldton-Greenough
Climate of Opportunity

out at all times and in all respects in accordance with the Traffic Management Plan.

4. Before the development/land use is commenced, the proponent is responsible to ensure that a Noise Management Plan is lodged with the local government for its approval, and is approved by the local government setting out in detail the management commitments applicable to noise minimisation relevant to all installations, activities and processes, based on actual sound level measurements of plant, both individually and in combination. The Noise Management Plan shall take proper account of tonal components, amplitude or frequency modulations or impulses, and the Plan shall demonstrate that noise emissions will achieve compliance with the requirements of the Environmental Protection (Noise) Regulations 1997. Once approved, the proponent from time to time is responsible to ensure, that all installations, activities and processes carried out at all times and in all respects in accordance with the Noise Management Plan.

5. Before the development/land use is commenced a contribution of $30,000 is to be made to the local government for the upgrading of public facilities at the current wind farm lookout, which may include (but not be limited to), seating, shade structures, public art, interpretation signage, etc.

6. Before the development/land use is commenced the proponent is to provide the local government with written confirmation from the Civil Aviation Safety Authority that the wind turbines do not impact upon the Obstacle Height Limitation Surface for the Geraldton Airport, and compliance with any requirements that Authority may have in regards to the installation of fixed beacon lighting (if required).

7. Before the development/land use is commenced a formal agreement is to be finalised and a copy provided to the local government for Lot 6944 Connolly Road, Walkaway ensuring that no residential uses are permitted.

8. No remnant vegetation shall be removed as part of this application except for the purposes of required access tracks, cable corridors or firebreaks.

9. The production of a Fire Management Plan and the provision of firebreaks around the site to the approval of the local government and the Fire and Emergency Services Authority prior to the issue of a building licence.

10. Site activities are to begin no earlier than 7am and where possible are to cease by 7pm Monday to Saturday and 9am to 7pm Sundays and Public Holidays to limit noise (as required).

11. Vehicles and equipment are to be properly maintained so as to minimise their noise characteristics.

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City of Geraldton-Greenough
Climate of Opportunity

Notes:

i. If the development/land use, the subject of this approval, is not substantially commenced within a period of five years after the date of determination, the approval shall lapse and be of no further effect.

ii. Where an approval has so lapsed, no development/land use shall be carried out without the further approval of the local government having first been sought and obtained.

iii. If an applicant is aggrieved by this determination there is a right (pursuant to the Planning and Development Act 2005) to have the decision reviewed by the State Administrative Tribunal. Such application must be lodged within 28 days from the date of determination.

iv. The RAAF should be advised of the proposal as it may affect training flights conducted in the locality.

v. The proposed temporary concrete batching plant will require registration or licensing by the Department of Environment and Conservation.

vi. Compliance is required with the Building Code of Australia.

vii. All operations upon this site are to comply with the requirements of the Environmental Protection (Noise) Regulations 1997 and the Environmental Protection Act in respect to noise emissions.

MURRAY CONNELL
Manager Town Planning Services

Date of Issue: 27/08/2009

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GERALDTON

GERALDTON - MT MAGNET ROAD

TO MT MAGNET

EDWARD ROAD

NARNGULU

RUDDS GULLY ROAD

RUDDS GULLY

BRAND HIGHWAY

CAPE BURNEY

(23 KMS TO GERALDTON - MT MAGNET ROAD)

EDWARD ROAD

NABBEJA ROAD / ARTHUR ROAD

NANGETTY WALKAWAY ROAD

EDWARD ROAD

EVANS ROAD

O'BRIEN CT

NANGETTY WALKAWAY ROAD (3.7 km)

ALLANOOKA SPRINGS ROAD (3.9 km)

GREENOUGH CROSS ROAD

(1.4 km)

FRASER ROAD

ALLANOOKA SPRINGS ROAD (8.2 km)

CONNOLY ROAD (2.8 km)

BOOKARA RD (UNSEALED)

ALLANOOKA SPRINGS ROAD

BOOKARA RD (UNSEALED)

TO BRAND HWY

RAILWAY CROSSING

TO DONGARA / PORT DENISON

BRAND HIGHWAY

INDIAN OCEAN

MUMBIDA HOEMSTEAD

MOUNT HILL

PROPOSED WIND FARM TURBINES AND ACCESS ROAD

MUMBIDA WIND FARM

SCALE 1 : 25 000

MONITORING TOWER

FENCE LINE

4 WHEEL DRIVE ACCESS ONLY

(2.5 km)

THROUGH GATE ON LEFT AND FOLLOW FARM TRACK ALONG FENCE TO WIND TURBINE SITES

CONNOLY ROAD (2.8 km)

ALLANOOKA SPRINGS ROAD

MUMBIDA WIND FARM

CONNOLY ROAD

CONNOLY ROAD (2.8 km)

CITY OF GERALDTON-GREENOUGH

THIS PLAN IS CERTIFIED AS THE 'APPROVED PLAN' FOR PLANNING APPROVAL

NO TP09/183

SHEET 1 of 3

Signed:

Dated: 26/08/2009

REV.	BY	DATE	DETAILS
B	GA	12 JAN 08	TURBINE LOCATIONS REVISED
A	GA	21 AUG 08	ISSUED FOR COMMENT

verve ENERGY

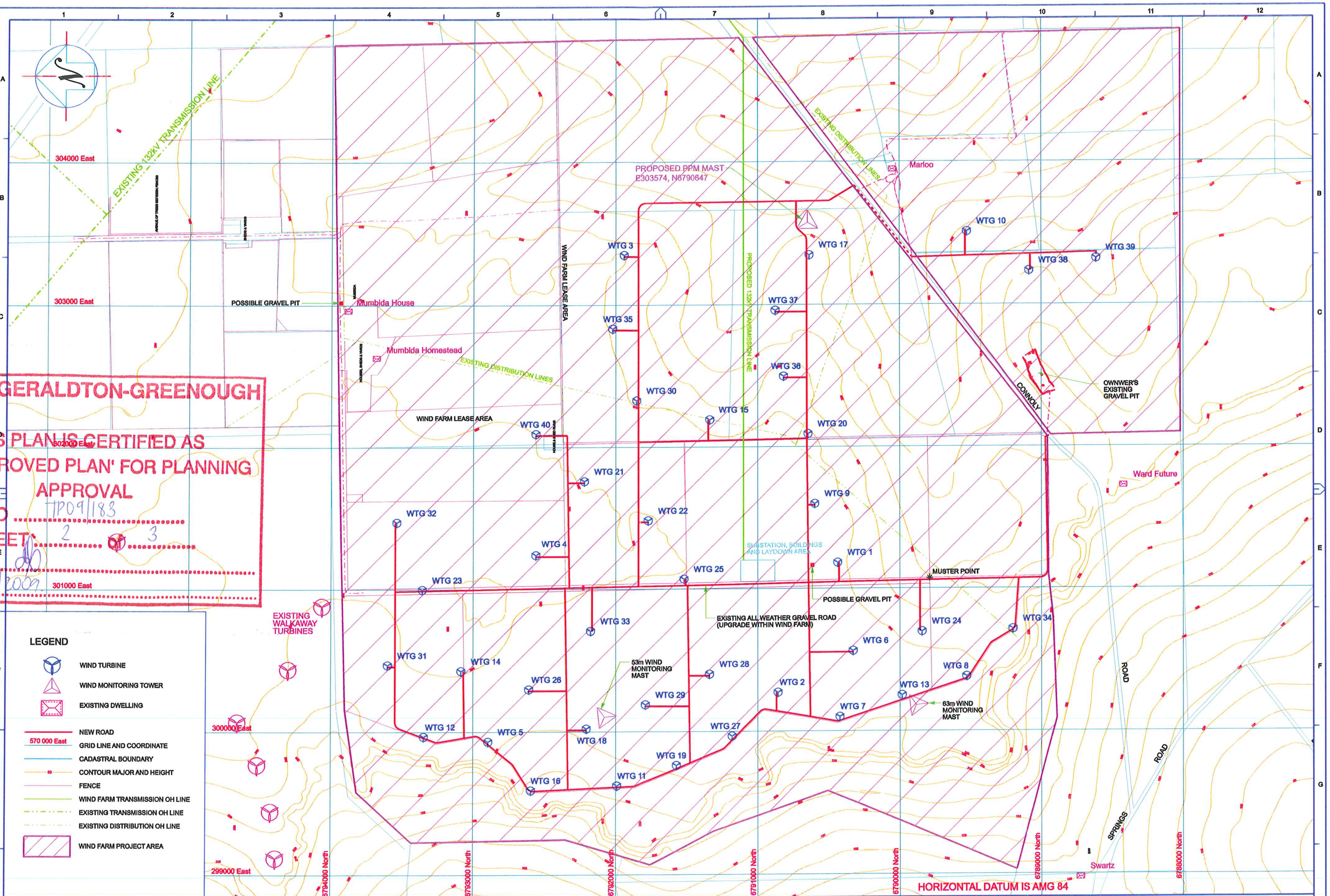
TITLE:

MUMBIDA WIND FARM SITE LOCATION MAP

DRAWN: GA DATE: AUG 2008
CHECKED: GBL
APPROVED: HL

DRG. No. DSEG-109-5-000-002
SCALE: 1: 75 000
NEXT SHT: -
REVISION: B

A1


EXISTING 132kV TRANSMISSION LINE
304000 East
303000 East
302000 East
301000 East
300000 East
299000 East
POSSIBLE GRAVEL PIT
Mumbida House
Mumbida Homestead
EXISTING DISTRIBUTION LINES
WIND FARM LEASE AREA
PROPOSED PPM MAST
E303574, N6790647
PROPOSED 132kV TRANSMISSION LINE
Marloo
OWNWER'S EXISTING GRAVEL PIT
CONNOLLY
Ward Future
SUBSTATION, BUILDINGS AND LAYDOWN AREA
MUSTER POINT
POSSIBLE GRAVEL PIT
EXISTING ALL WEATHER GRAVEL ROAD (UPGRADE WITHIN WIND FARM)
53m WIND MONITORING MAST
63m WIND MONITORING MAST
EXISTING WALKAWAY TURBINES
SPRINGS ROAD
Swartz
6794000 North
6793000 North
6792000 North
6791000 North
6790000 North
6789000 North
6788000 North
HORIZONTAL DATUM IS AMG 84
WTG 1
WTG 2
WTG 3
WTG 4
WTG 5
WTG 6
WTG 7
WTG 8
WTG 9
WTG 10
WTG 11
WTG 12
WTG 13
WTG 14
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WTG 29
WTG 30
WTG 31
WTG 32
WTG 33
WTG 34
WTG 35
WTG 36
WTG 37
WTG 38
WTG 39
WTG 40
LEGEND
WIND TURBINE
WIND MONITORING TOWER
EXISTING DWELLING
NEW ROAD
570 000 East
GRID LINE AND COORDINATE
CADASTRAL BOUNDARY
CONTOUR MAJOR AND HEIGHT
FENCE
WIND FARM TRANSMISSION OH LINE
EXISTING TRANSMISSION OH LINE
EXISTING DISTRIBUTION OH LINE
WIND FARM PROJECT AREA

CITY OF GERALDTON-GREENOUGH

THIS PLAN IS CERTIFIED AS THE 'APPROVED PLAN' FOR PLANNING APPROVAL

NO TP09/183

SHEET 2 OF 3

Signed:

Dated: 26/08/2009

REV.	BY	DATE	DETAILS	REV.	BY	DATE	DETAILS
E	GA	25 SEP 08	WTG 1&14 moved; trans. lines and monitoring mast added.	J	GA	17 DEC 08	Gravel pit removed.
D	GBL	08 AUG 08	Turbines moved to GH issue B plan B fro 80m tower, easy noise	I	GA	26 NOV 08	Substation & transmission line position revised; minor road revision.
				H	GA	18 NOV 08	WTG 1-39 positions revised; WTG 40 added.
L	GA	30 MAR 09	Access area added	G	GA	10 NOV 08	WTG 22 to 39 added.
K	GA	14 JAN 08	Proposed PPM masted added	F	GA	23 OCT 08	WTG 5,9-14,16-18&21 moved after "ground truthing"; gravel pits added.

verve ENERGY

TITLE:

MUMBIDA WIND FARM SUZLON SITE PLAN

DRAWN: GBL DATE: JUNE 2008
CHECKED: HL
APPROVED: DT
DRG. No. DSEG-119-5-000-001
SCALE: 1:12 500
NEXT SHT: -
REVISION: L
A1

CITY OF GERALDTON-GREENOUGH

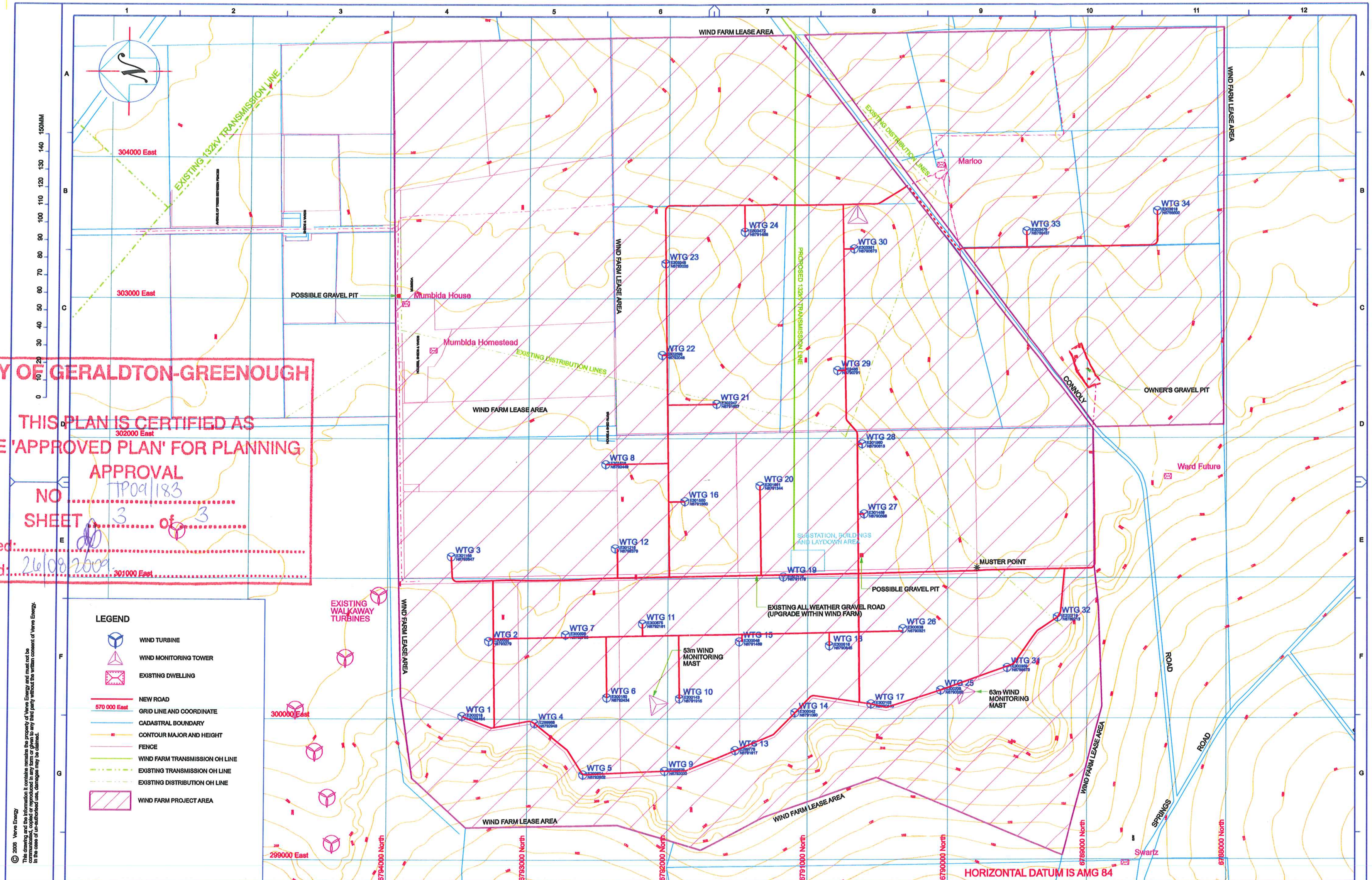
THIS PLAN IS CERTIFIED AS THE 'APPROVED PLAN' FOR PLANNING APPROVAL

NO. TP09/183

SHEET 3 of 3

Signed: [signature]

Dated: 26/08/2009



WIND FARM LEASE AREA
EXISTING 132kV TRANSMISSION LINE
EXISTING DISTRIBUTION LINES
PROPOSED 132kV TRANSMISSION LINE
POSSIBLE GRAVEL PIT
Mumbida House
Mumbida Homestead
Marloo
OWNER'S GRAVEL PIT
Ward Future
Swartz
CONNOLLY
SPRINGS ROAD
SUBSTATION, BUILDINGS AND LAYDOWN AREA
MUSTER POINT
EXISTING ALL WEATHER GRAVEL ROAD (UPGRADE WITHIN WIND FARM)
53m WIND MONITORING MAST
63m WIND MONITORING MAST
EXISTING WALKAWAY TURBINES
304000 East
303000 East
302000 East
301000 East
300000 East
299000 East
6794000 North
6793000 North
6792000 North
6791000 North
6790000 North
6789000 North
6788000 North
HORIZONTAL DATUM IS AMG 84
LEGEND
WIND TURBINE
WIND MONITORING TOWER
EXISTING DWELLING
NEW ROAD
570 000 East GRID LINE AND COORDINATE
CADASTRAL BOUNDARY
CONTOUR MAJOR AND HEIGHT
FENCE
WIND FARM TRANSMISSION OH LINE
EXISTING TRANSMISSION OH LINE
EXISTING DISTRIBUTION OH LINE
WIND FARM PROJECT AREA

REV.	BY	DATE	DETAILS
D	GBL	30 MAR 09	Wind farm access road added
C	GA	5 FEB 09	WTG layout revised.
B	GA	17 DEC 08	Gravel pit removed.
A	GA	11 DEC 08	Issued for comment.

verve ENERGY

TITLE:

MUMBIDA WIND FARM GE SITE PLAN

DRAWN: GA DATE: DEC 2008
CHECKED: HL
APPROVED: DT

DRG. No. DSEG-119-5-000-100

SCALE: 1: 12 500

NEXT SHT: -

REVISION: D

Appendix B. Certificate of Title

WESTERN AUSTRALIA

REGISTER NUMBER	
103/DP71380	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
2	31/3/2014

VOLUME 2820 FOLIO 293

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 103 ON DEPOSITED PLAN 71380

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

EVAN CLERE HAMERSLEY
EVELYN DAWN HAMERSLEY
BOTH OF REDCLIFFE, WALKAWAY
AS TENANTS IN COMMON IN EQUAL SHARES

(AF M398509) REGISTERED 10/9/2013

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. L069767 LEASE TO ELECTRICITY GENERATION CORPORATION OF LEVEL 11, 15-17 WILLIAM STREET, PERTH EXPIRES: SEE LEASE. REGISTERED 10/9/2009.
   - L254864 EASEMENT BENEFIT FOR NOISE BUFFER PURPOSES. SEE SKETCH ON DEPOSITED PLANS 65317 AND 71380. REGISTERED 11/3/2010.
   - L319410 EASEMENT BENEFIT FOR NOISE BUFFER PURPOSES. SEE SKETCH ON DEPOSITED PLANS 64258 AND 71380 REGISTERED 19/5/2010.
   - L442321 EASEMENT BENEFIT FOR NOISE BUFFER PURPOSES. SEE SKETCH ON DEPOSITED PLANS 64259 AND 71380. REGISTERED 1/10/2010.
   - L508641 EASEMENT BENEFIT FOR NOISE BUFFER PURPOSES. SEE SKETCH ON DEPOSITED PLANS 65318 AND 71380. REGISTERED 16/12/2010.
   - L617211 EXTENSION OF LEASE L069767. REGISTERED 4/5/2011.
   - L626702 TRANSFER OF LEASE L069767, LESSEE NOW MUMBIDA WIND FARM PTY LTD OF LEVEL 11, 15-17 WILLIAM STREET, PERTH REGISTERED 13/5/2011.
   - *N849548 MORTGAGE OF LEASE L069767 TO CBA CORPORATE SERVICES (NSW) PTY LIMITED REGISTERED 13/3/2018.
2. *M428403 CAVEAT BY RPV DEVELOPMENTS PTY LTD LODGED 11/10/2013.
3. M577132 EASEMENT TO ELECTRICITY NETWORKS CORPORATION FOR ELECTRICITY PURPOSES. SEE DEPOSITED PLAN 76588 REGISTERED 14/3/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

END OF PAGE 1 - CONTINUED OVER

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP71380
PREVIOUS TITLE:	2760-854
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	CITY OF GREATER GERALDTON

Appendix C. Mumbida Wind Farm Development Application

ATTACHMENT TO THE APPLICATION FOR PLANNING APPROVAL

TO THE

CITY OF GERALDTON - GREENOUGH

FOR THE

MUMBIDA WIND FARM

verve ENERGY

JUNE 2009

Copyright Claim

Table of Contents

1 Abbreviations

DRF	Declared Rare Flora
GWh, kWh	Electricity units are sold in kilowatt hours (kWh) where 1 kWh = 1kW used for 1 hour. 1 GWh = 1,000,000 kWh.
kW	Kilowatts, which means 1 thousand watts of electricity
kV	Kilovolts, which means 1 thousand volts of electricity
MW	Megawatts, which means 1 million watts of electricity
REC	Renewable Energy Certificate
SCADA	Supervisory Control and Data Acquisition
SWIS	South West Interconnected System (electrical network)

2 Definitions

Hardstand	A level area of compacted limestone/gravel used for supporting heavy loads during construction, such as cranes
Site	The Mumbida Wind Farm site
Nacelle	The part of the wind turbine that sits on top of the tower
Rotor	The part of the turbine comprising blades and hub

3 Project Proponents

The proponent of the Mumbida wind farm is Verve Energy (ABN 58 673 830 106). Verve Energy is responsible for the development of the Mumbida wind farm.

The project development is being undertaken by Sustainable Development, Strategy and Business Development group of Verve Energy. The Project Manager is responsible for all day-to-day activities of the project and should be the point of contact for the City. Contact details are as follows:

Mr Heath Lang
Mumbida Wind Farm Project Manager
Sustainable Development
Strategy and Business Development
Verve Energy
Level 11, Australia Place
15-17 William Street
Perth WA 6000
Ph: (08) 9424 1807
Mob: 0427 381 249
Email: heath.lang@verveenergy.com.au

The project Superintendent has overall responsibility for the project. Contact details are as follows:

Mr Daniel Thompson
Manager Sustainable Development
Strategy and Business Development
Verve Energy
Level 11, Australia Place
15-17 William Street
Perth WA 6000
Ph: (08) 9424 1851
Mob: 0428 928 894
Email: daniel.thompson@verveenergy.com.au

Verve Energy is in the process of forming a joint venture entity for the financing of this project. The other joint venture party/s will provide some equity, and the residual will be debt financed. The joint venture entity is likely therefore to ultimately own this project.

It is likely that the joint venture entity will appoint a third party to undertake the detailed engineering, procurement, construction and commissioning of this project. Furthermore it is likely that Verve Energy will be responsible for the Operation and Maintenance of this facility, with support contracts (such as from the wind turbine supplier).

Verve Energy will ensure that any commitments made by itself, and any conditions required by the City of Geraldton-Greenough will be passed on to relevant parties through contractual agreements.

4 Executive Summary

Verve Energy submits this application to the City of Geraldton-Greenough seeking approval for the development of a wind farm approximately 40km South-East of Geraldton.

The project is located at Mumbida farm and near the southern-end of the existing Walkaway wind farm. The project consists of up to 42 turbines with a generation capacity of up to 90MW located on cleared rural land and does not result in any serious social or environmental impacts.

The wind farm will generate up to 320 GWh of electricity per year, the equivalent electricity use of 50,000 houses. This wind farm will feed electricity into the Western Australian main grid supplying renewable electricity free of carbon emissions. It is estimated that this project will lead to the offset of 240,000 tonnes per year of greenhouse gas emissions.

This project was originally instigated in 1999, with the original project consisting of 50 turbines with a generation capacity of up-to 60MW and was proposed by Wind Energy Corporation, a Western Power Joint Venture. The original project was assessed and granted approval by the Shire of Greenough on 29 May 2002. On receiving approval the project did not proceed due to the State government direction to allow greater private sector investment and competition in energy generation infrastructure. Following this Western Power was disaggregated into four separate entities, including Verve Energy who was given ownership of the project.

In 2008 Verve Energy was able to revisit the feasibility study for this project due to the availability of network access as a result of the planned 330kV line installation from Eneabba to Moonyoonooka (near Geraldton).

This is a new application submitted for approval for up to 42 turbines with a generation capacity of up to 90MW on Lots 10284 and 6944.

Whilst it is Verve Energy's considered opinion that the previous approval in respect of up to 50 turbines on Lot 10284 has not lapsed[1], it is understood and appreciated that the City of Geraldton-Greenough has a different view. In this context Verve Energy submits full details of the revised project for Council's consideration and seeks approval on the ground that:

- The project is consistent with the City of Geraldton-Greenough Town Planning Scheme and the City's policies;
- The project is consistent with new state government planning and environmental guidelines, such as *Planning Bulletin 67* in particular regarding noise and visual impact;
- Community consultation has been carried out (including re-contacting surrounding landowners), with no significant concerns identified; and

[1] *Refer to Section 7.2.2 for detailed justification of position.*

- The project was previously approved without any concerns, and this new application is generally consistent with the original Shire of Greenough conditions of approval.

In addition, since 2005 the 54 turbine Walkaway wind farm has been in operation next to Mumbida and the Walkaway II expansion has been approved without any technical, environmental, statutory or public concerns.

5 Site analysis

5.1 Site selection

The primary issues in identifying possible wind farm sites are wind resource, transmission access and social acceptability.

Western Australia has an excellent wind resource; however, there are limited locations for commercial wind farm development. The main reasons are that many of the windy areas are either inaccessible due to their recognised natural heritage value, such as National Parks or specific Reserves, or they are too far from the high voltage electricity transmission network. If a wind farm is too far from the networks then long above ground high voltage lines are required. These lines can be prohibitively expensive and can involve substantial land and environmental disturbance. Transmission lines can also be unpopular with local communities.

A wind farm does not supply what is called 'firm capacity'. This simply means that a wind farm cannot be turned on at anytime to get maximum electricity output, as it depends on what the wind is doing. While the wind cannot be controlled, a site can be chosen where the wind blows when the energy is most needed. To do this it is necessary to understand how wind fluctuates with seasons and throughout the day, which requires long term wind resource measurements.

The size of a transmission network is also important. In Western Australia, as a consequence of our spread out and small population the electrical system is weak and may be disturbed by large amounts of wind energy input.

Social acceptability is an increasingly important issue for wind farm developments. Wind farms need to be appropriately sited, and the community engaged in its development.

The proposed location of Mumbida wind farm is adjacent to the existing Walkaway wind farm, and has all the positive features identified for a wind farm. Verve Energy has a good understanding of the issues that need to be addressed at this site. With long-term wind resource information available and long term experience of operating wind turbines at other sites, Verve Energy has the confidence to pursue a new wind farm development at this site.

Further information relating to site selection and the suitability of the site is provided throughout Section 8 Feasibility Investigations.

5.2 Land tenure and zoning

The proposed Mumbida wind farm location lies within the area bounded by Allanooka Springs Road, Connolly Road, and Burma Road, and directly involves the following lots:

1. Lot 10284 – 1805 Ha(E and E Hamersley); and

2. Lot 6944 – 660 Ha (E and E Hamersley).

Verve Energy is currently in the advanced stages of negotiating a lease agreement with the landowners for Lot 10284 and Lot 6944.

Note: Verve Energy currently holds an easement over Lot 10284, but this does not provide a sufficient area for the current wind farm proposal.

Verve Energy is also negotiating noise buffer easements over parts of surrounding properties that are likely to be affected by noise level above the levels prescribed under the Environmental Protection (Noise) Regulations 1997. The lots that are affected by a noise buffer are:

Lot 1 (Ward)

Lot 3969 (Swartz)

Lot 7968 (L. Hamersley)

Lot 756 (Rose)

The total land area involved in this project is up to 3200 Ha, although the actual development footprint is up to 50 Ha (See Section 8 Feasibility Investigations for further details on the development footprint).

All Lots involved are zoned as "General Farming" under the *City of Geraldton-Greenough Town Planning Scheme No. 4 – District Zoning Scheme*. The surrounding land zoning is "General Farming" apart from an area zoned "Special Rural" on the south western boundary of the site (as per City of Geraldton-Greenough (CGG) Town Planning Scheme No. 4 (Greenough) – Map 1 of 11 20 Nov 2007).

5.3 Existing environment

The Mumbida wind farm will be situated on cleared and grazed farmland. The land is used for cropping and stock, and the landowner intends to utilise the land for this purpose following the installation of the wind farm.

Close to the western boundary of the property, there is an escarpment that runs along a north-south axis, which is covered with remnant vegetation. It is understood from discussion with the Department of Environment and Conservation (DEC) that strips of remnant vegetation such as this are regionally significant. Verve Energy will therefore ensure that this area will be unaffected by the wind farm development.

The land to the east forms a flat plateau that has been cleared for agriculture, and it is on this land the wind turbines will be installed. The construction and operation of Mumbida wind farm will not significantly interfere with existing land use once the project is in operation due to the relatively small development footprint.

There are also a number of homesteads located around the project area. Most of the residences in the neighbouring area are owned by financial participants in the project.

See Appendix 3 Drawings for an aerial view of the existing environment within 3km of the wind farm site.

Further information relating to environmental effects is provided in Sections 8.8 and 8.9.

6 Wind Farm Proposal

6.1 Introduction

This document is an Attachment to the Application for Planning Approval submitted by Verve Energy to the City of Geraldton-Greenough (the "City") for the Mumbida Wind Farm.

A Development Application for the Mumbida Wind Farm was previously submitted to the Shire of Greenough in May 2002. Conditional approval was granted at a meeting of the Council on 29th May 2002 (Correspondence reference: 1550121 (H05.02.22):SL4:DS).

The revised Mumbida Wind Farm is a development of up to 90MW of installed wind turbine capacity and associated infrastructure to be built approximately 40km to the South-East of Geraldton and to the South of the existing Walkaway Wind Farm. The facility will consist of up to 42 wind turbines with an output ranging from 2 to 2.5MW each, and will feed its output into the Western Australian South West Interconnected System (SWIS).

The wind farm is the culmination of numerous years work by Verve Energy and its Joint Venture partners since 1999, driven by the need to generate electricity more cleanly and sustainably. Verve Energy is seeking to build wind farms because wind turbines do not cause pollution, do not contribute to global warming and the wind resource is virtually inexhaustible. The chosen site is an excellent one for wind farming having a good wind resource, available land and a community already comfortable with the technology. Background information on wind energy and Verve Energy's involvement in wind energy development is provided in Appendix 1.

The project has been previously developed to the stage where all statutory approvals had been granted and a power purchase agreement (PPA) was negotiated and presented to the Minister for Energy for endorsement. However, this PPA was rejected by the then Minister for Energy who wanted to encourage private electricity infrastructure. The subsequent installation of the Walkaway wind farm introduced a network capacity constraint to the area meaning that the Mumbida project could not proceed.

Western Power's recent announcement of a new 330kV transmission line to Geraldton has meant that this project can now be progressed again, as additional network capacity will be made available in the Mumbida wind farm area once this transmission line is completed.

Following Western Power's announcement on the new transmission line, Verve Energy has re-run a feasibility study on the proposed Mumbida wind farm examining the technical, social, environmental and financial aspects of the project. This study has involved the Geraldton-Greenough community, public officials as well as formal agencies and other stakeholders. While this study is yet to conclude, the results to date have been very promising, and sufficient work has been undertaken to allow this Application to be submitted.

The feasibility study has assessed issues including visual amenity, noise, environmental disturbance, impacts on local flora, fauna and the engineering details of building the wind farm. This application outlines the key results of the feasibility study.

Final approval of for this project will be sought from Verve Energy's Board of Directors and the Minister of Energy once final statutory approvals have been granted and funding

arrangements resolved. If all approvals are received, the Mumbida wind farm would take approximately two years to construct.

6.2 Mumbida Wind Farm

As the final wind farm design is still being progressed, Verve Energy are taking into consideration a range of suitable wind turbines including wind turbines from Suzlon, GE and Enercon. The following table summarises the wind turbines currently being considered:

Turbine type	**Suzlon S88 2.1MW**	**GE 2.5xl 2.5MW**	**Enercon E82 2MW**
Number of turbines	40	34	42
Hub height	80m	85m	78m
Number of rotor blades	3	3	3
Rotor diameter	88m	100m	82m
Tip height above ground level	124m	135m	99m

The Mumbida Wind Farm will consist of up to 42 wind turbines, associated electrical cabling and facilities and access roads. Each wind turbine will be connected to one of five underground cables that will take the electrical output to a substation to be built on the site and connected to the Three Springs - Geraldton 132kV transmission line, a part of SWIS. The location of the site is shown in Appendix 3 Drawings.

The wind turbines will have a maximum tower height of 85m and three blades with a maximum rotor diameter of 100m. The blades are rated at a maximum of 14 revolutions per minute (rpm). Each turbine will be placed on a circular steel tower, bolted to a steel reinforced concrete foundation. The foundation will sit below ground except for the portion which meets the tower just above ground level. A control panel and switchboard will be housed inside the base of each turbine tower. A typical wind turbine arrangement is shown below in Figure 1.

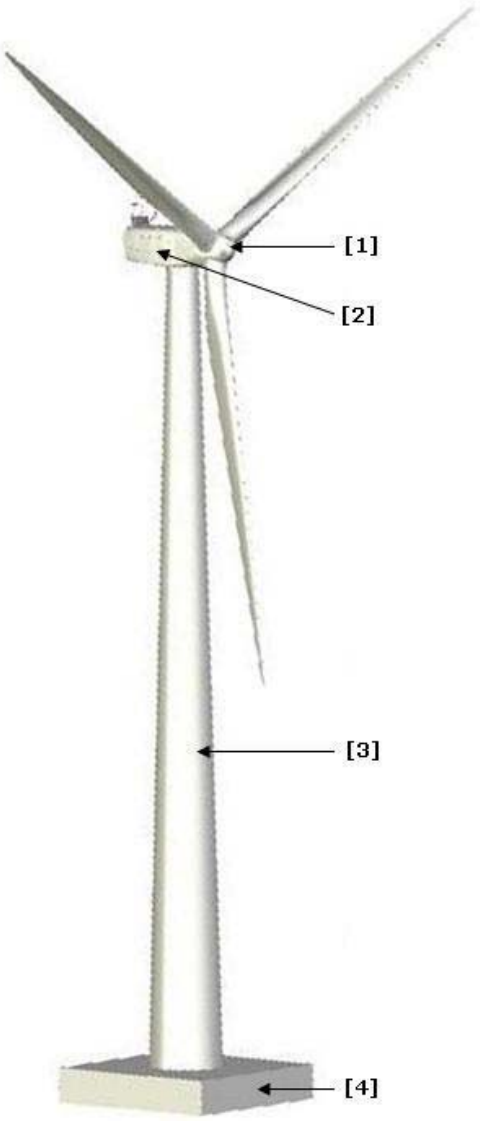


Figure 1- Suzlon S88 wind turbine

[1] Rotor with rotor blades, [2] Nacelle, [3] Tubular tower, [4] Foundation

The structure at the top of the tower, known as the nacelle, will house the generator and main shaft connected to the blades. The nacelle will yaw with changes in wind direction to keep the blades oriented into the wind.

Access to the nacelle and blades for maintenance will be by internal ladder (and or personnel lift) and safety harness. An electrically operated winch, housed in the nacelle, will be used to lift any heavy equipment required for maintenance.

The wind turbines will be positioned to take full advantage of the natural winds while keeping within the environmental, social and technical constraints of the Site. The turbines

will operate in wind speeds from 3 m/s up to a maximum of 34m/s above which they will be shut down for high speed wind protection, using mechanical and aerodynamic braking.

Each turbine will produce electricity at their nominal generating voltage to be stepped up to 22,000 volts by a transformer located in the base of each turbine. The farm will be reticulated with underground cable connecting to each transformer and running beside the service roads or property fences. The cables will collect the farm output to a substation located at a convenient point within the farm where it will be stepped up to 132,000 volts for connection to the previously mentioned Three Springs – Geraldton transmission line.

Connection to the 132,000 volt network will likely be by an approximately 6.5km long overhead transmission line run through the wind farm site and along Connolly Road to the existing 132,00 volt network, as shown in Appendix 3 Drawings. This aspect of the project is being managed by Western Power who will own and operate the line.

Approximately four guy wired wind monitoring masts up to 100m in height will be permanently installed as part of the wind farm. These masts will allow the ongoing performance of the wind turbines to be monitored and evaluated.

Further technical details for the Mumbida Wind Farm are provided in Appendix 2.

6.3 Project Schedule

The project schedule, as it is currently envisaged, is summarised below:

Item	**Date**
Feasibility study commenced	August 2008
Stakeholder Management commenced	October 2008
Obtain all necessary statutory approvals	September 2009
Conclude feasibility and evaluate whether to proceed	September 2009
Commence equipment procurement	March 2010
Commence construction	March 2010
Wind farm commissioned	March 2012

The timing of this project is contingent upon Western Power completing the 330kV / 132kV line upgrade from Eneabba to Moonyoonooka. Whilst this wind farm will connect to the 132kV part of the network, there is no network capacity in the area to connect new generation until the 330kV line is operational. The current completion date for the 330kV line is December 2010, but informal advice suggests it may be some time after this date. Verve Energy is investigating alternative solutions such that this wind farm is not totally reliant on the 330kV line and will keep the City of Geraldton-Greenough informed of any timing changes in the development schedule.

Construction of Mumbida wind farm is expected to commence around March 2010 and to continue for a period of 18 to 24 months. The establishment of the site facilities will be completed first, followed by the construction of the access roads, installation of the tower structures and turbines and substation power reticulation facilities.

6.4 Project Justification

The Enhanced Greenhouse Effect and the national (and international) imperative to lower greenhouse gas emissions is the prime reason why Verve Energy wishes to build the proposed Mumbida wind farm. The national imperative is shown by the Australian Government's public commitment to a carbon pollution reduction target of 5 to 15 percent below 2000 levels by 2020.

One way to achieve lower greenhouse emissions is to supplement electricity from fossil fuels (one of the leading sources of Australian emissions) with renewable energy generation which do not produce these gases. The Australian Government is seeking to encourage renewable generation through the expanded Renewable Energy Target. There is currently legislation before the parliament to increase the target to 20 per cent (45 000 GWh) of Australia's electricity supply comes from renewable energy sources by 2020 (compared to the previous target of 2 per cent (9,500 GWh) of energy from new renewable resources by 2010).

Under the legislation, renewable energy generators create one renewable energy credit REC for each MWh of renewable energy generated. While not all new generation qualifies, new wind energy generation qualifies for the creation of RECs. This creates an additional revenue stream for the project. A feature of the RECs is that they are not geographically specific and a REC created in one part of Australia can be used to satisfy a retailer's commitments in a different location with minimal cost.

In addition, the Australian Government has announced its intent for the Carbon Pollution Reduction Scheme to commence on 1 July 2010. This Scheme will introduce emissions trading which will put a price on carbon emissions with the aim of reducing carbon pollution. Whilst this does not directly effect renewable energy developments, it does create a more level playing field with other generation sources that do emit carbon pollution.

In addition to the Australian Government legislation, various State Governments are introducing carbon reducing measures for electricity retailers. These actions will further enhance the attractiveness for renewable energy projects.

Of the renewable technologies currently available, hydro-electric is the most economic and is competitive with fossil-fuelled generation. However, there is no large hydro resource available within Western Australia in the area covered by the SWIS. Renewable energy technologies that are both available and appropriate to Western Australia include biomass, wave and tidal schemes, waste-to-energy, different solar technologies and wind turbines. While several of these are likely to make a contribution at some time in the future, wind farms offer the most commercial prospect for renewable generation on the SWIS. Wind farms also have the potential to offer a significant amount of power.

Western Australia has an exceptional wind resource and land available for wind farming. The available resource is conservatively estimated at many thousands of megawatts. Despite this, and the maturity of the technology, any wind farm on the SWIS would still

produce power which is more expensive than currently generated by coal and gas-fired plant. Consequently, only the best wind sites will meet the difficult financial constraints while satisfying environmental constraints.

The proposed Mumbida wind farm has the potential to offer a considerable amount of renewable energy to the SWIS, economically, and with a minimal impact on the surrounding environment and community effect. This proposal offers the best way currently to lower the emissions of greenhouse gases on the SWIS through the use of a renewable energy generation.

7 Planning Context and Justification

7.1 State Government Requirements

7.1.1 Planning Bulletin No. 67 (2004) – Guidelines for Wind Farm Development

The Western Australia Planning Commission's *Planning Bulletin 67 (PB67) - Guidelines for Wind Farm Development (May 2004)* provides local government and wind farm developers with a planning framework for land-based wind farm developments. Key statutory issues outlined for consideration by PB 67 in section 5.0 and 6.0 include:

5.1 Land use and planning controls

The Model Scheme Text does not include a definition of wind farms or wind energy facilities; hence these developments are usually "a use not listed " in town planning schemes. In rural, non-urban and similar zones, local government should consider wind farm proposals under the provisions of Clause 4.4.2 (b) Model Scheme Text; that is, the use is considered as a discretionary use for which the approval of local government is required and the public advertising procedures of Clause 9.4 apply.

The Shire of Greenough – Town Planning Scheme No. 4 - District Zoning Scheme does not provide a definition for wind farms or wind energy facilities. In 2002 Council identified that a wind farm development on lot 10284 as either 'Electricity Generation' or 'Fuel and Power Generation Plant'. These uses are not permitted within the General Farming zone unless special approval is given or they are permitted if they are considered incidental respectively. In the case of lot 10284 wind farm development was approved without advertising 29 May 2002 after the proponent had complied with all relevant legislation and undertaken public consultation within a radius of 3km and a public meeting.

Despite Scheme No. 4 not having a definition of wind farms or wind energy facilities these uses have previously been approved without additional Council advertising. The current proposal complies with all relevant legislation and has again undertaken public consultation within a radius of 3km without concerns being raised. However, if Council considers it necessary, an additional public consultation for a period of 21 days, as opposed to the minimum 14 days stated by the Model Scheme Text and in accordance with the Shire's Scheme clause 6.2 Applications for Special Approval is deemed appropriate.

Where a proposal would have a significant effect on the environment, it must be referred to the Environmental Protection Authority (EPA) by the decision-making authority.

The Environment Protection and Biodiversity Conservation Act 1999 is the Australian Government's key environmental legislation and provides a legal framework to protect and manage important flora, fauna, ecological communities and heritage places of national environmental significance. The project was originally referred to the EPBC in May 2002 based on the original 50 turbine design. After assessment, the response received from the EPBC was that approval was not required. This assessment is still considered valid, as there are no new issues of national environmental significance associated with the current proposal.

The Environmental Protection Act 1986 is the principal environmental legislation in Western Australia. The project was originally referred to the Environmental Protection Agency (EPA) based on the original 50 turbine design and received a determination of Not Assessed – Public Advice Given in April 2002. Verve Energy has since advised the EPA of the current proposal and the EPA has confirmed that there are no new significant new environmental issues associated with the current proposal, and hence the previous decision is still considered valid.

Where an area is particularly well suited to wind energy production, there may be a cumulative effect, as multiple proposals for wind farms are generated. Each proposal must be determined on its merits, having regard to the overall context of the area and its ability to accommodate future development.

The Mumbida wind farm does not have any significant cumulative impacts on the surrounding area. The Walkaway wind farm has operated without public or environmental concern since 2005 and Walkaway II has been recently approved. The Mumbida wind farm is smaller than these two projects. The project does not interfere with any existing rural activities in the area and long term does not have significant impact on amenity such as visual character - See Section 8.1.

5.2 Public Health and Aircraft Safety

The wind farm development should be highlighted on all navigational map and the Civil Aviation Safety Authority, Air Services Australia and the RAAF, should be consulted

Mumbida wind farm will be located approximately 40km to the South East of the Geraldton airport site. The wind turbines do not penetrate the Obstacle Limitation Surfaces OLS for the Geraldton Airport Site so it is Verve Energy's understanding that the turbines will not be designated as obstacles to aircraft operating in their vicinity.

It is a requirement under Civil Aviation Safety Regulations 1998 (CASR) Part 139 to notify Civil Aviation Safety Authority (CASA) by a person who proposes to construct a building or structure the top of which will be 110 metres or more above ground level. This applies to the wind turbines proposed. In addition CASA Advisory Circular AC 139-18(0) OBSTACLE MARKING AND LIGHTING OF WIND FARMS JULY 2007 details the requirements to mark and light wind turbines.

CASA has been notified of the proposed wind turbine locations based on the preliminary design. CASA has no objections to our proposal as long as the turbines are painted a visible white colour and appropriate notifications are carried out. CASA has not stipulated the need for aircraft warning lights.

Given the low risk, Verve Energy's preference is to not use such lights on the wind turbines as they cause a visual impact at night and the lights attract insects, which can attract birds and bats leading to the potential for avian strikes to occur.

The final location of the wind turbines will be provided to the Civil Aviation Safety Authority, Air Services Australia, WA Country Airstrip Guide; and Royal Australian Air Force prior to construction commencing.

Public access and traffic should be managed during construction.

A construction and traffic management plan will be developed to ensure road and public safety as stated in Section 8.5. 1. Public entry to the site will be strongly discouraged during construction due to the potential safety risks and will be managed as per Section 8.9.8.

5.3 Socio-economic Benefits

The assessment and consultation process should allow for any potential negative impacts, such as visual impact, to be considered in the context of their benefits.

The Mumbida Wind Farm will provide additional renewable energy to the SWIS to assist in mitigating climate change and further assist establishing Geraldton and Greenough as an emerging green energy hub. These are positive environmental and economic benefits and the wind farm will not have any significant negative impacts such as visual impact as stated in Section 8.1.

A management plan for visitors should be considered if the wind farm is to be accessible or visible to the public.

An existing tourist viewing platform has been previously established at Walkaway wind farm, and Walkaway II has proposed to upgrade these facilities. Verve Energy is currently considering how best to contribute to tourism and the local community as further discussed in Section 8.6.

5.4 Construction, Infrastructure and Utilities

A construction and traffic management plan will be developed to ensure road and public safety as stated in Section 8.5. This will include coordination with the City of Geraldton-Greenough, Shire of Irwin and Main Roads WA. Police Escorts may be required for some oversize loads.

All works shall be performed in accordance with good engineering practice and industry standards. All equipment shall be supplied, erected and/or installed in accordance with any relevant Australian and International Standards and the manufacturer's specifications.

The design (and construction methodology) is to minimise disturbance and impact on the existing environment and topography as follows:

- *The project will be constructed on clear and open farm land, hence minimising its impact on the surrounding environment such as remnant vegetation.*
- *In relation to roads and hardstands, cut and fill is to be kept to a minimum. Further details provided in Appendix 2.*

- *In siting of major components such as the wind turbines consideration has been given to their visual amenity as stated in Section 8.1.*

- *The internal medium voltage electrical network and communication cabling within the wind farm will be underground.*

- *The high voltage (132kV) connection to the electricity network will be overhead due to economic reasons but efforts have been made to minimize the length required and to reduce its visual effect.*

During the operation of the wind farm there will be both permanent and temporary workers at the wind farm site. On-site services including water, electricity, ablutions and meal facilities will be provided, as discussed in Appendix 2.

Decommissioning, if and when required at the end of the wind farm life, will be carried out and the site reinstated to its original use and condition, the only exception being wind turbine foundations due to practical and economic reasons. Decommissioning requirements are part of the agreement with affected landowners.

6.1 Landscape and Visual Impact

The Mumbida wind farm is located in a highly modified landscape with an existing wind farm in operation. A Visual Landscape Evaluation and Impact Assessment has identified that the project will not have a significant visual impact as it will not significantly change the visual character of the area. See Section 8.1 and Appendix 7 for further details.

6.2 Noise

Verve Energy engaged consultant SVT Engineering to undertake an Environmental Noise Assessment for the Mumbida wind farm. The results were assessed according to the Wind Farms Environmental noise guidelines (interim), December 2003, EPA South Australia and the WA Noise Regs 1997.

The report shows that there is compliance with the above regulations and guidelines at all surrounding noise sensitive premises without the need to consider background noise (e.g. noise levels are 35 dB(A) or less across the range of wind speeds modelled).

The only exception is the Marloo homestead on Lot 6944, which is within the wind farm area lease area where the predicted maximum noise levels is ~40 dB(A). This homestead is currently not being used for residential purposes. In addition to ensure that this is the case in the future, the lease agreement with the landowner (E Hamersley) for the whole of Lot 6944, only allows normal farming activities to occur on the property, which excludes residential dwellings. Therefore, there is no noise issue at this premise.

Noise buffer easements are being negotiated with effected landowners (as discussed in Section 5.2) consistent with the above noise modelling results. By Verve Energy negotiating the noise buffers with nearby landowners that will be registered on the title of Lots involved, we can ensure minimal disturbance into the future.

Other than the wind turbines, there will be limited noise associated with light vehicle movements, and routine maintenance tasks being carried out by site personnel. There may be increased noise associated with non-routine maintenance (such as the replacement of blade, generator, etc) but these events do not happen often and will be managed separately to ensure compliance with the Environmental Protection (Noise) Regulations 1997 (WA Noise Regs 1997).

Further details are provided in Section 8.2 and Appendix 6.

6.3 Other Possible Amenity Effects

Shadow flicker, glint, electromagnetic interference

In the case of the Mumbida wind farm, the nearest resident to any turbine is greater than 1 km, so shadow flicker and overshadow will not be an issue for this project. This is discussed further in Section 8.1.2.

The effect of glare has been minimised, as the proposed turbines will have blades of non-gloss pale grey colour. Therefore glare is not considered an issue for this project. This is discussed further in Section 8.1.3.

An electromagnetic interference study was undertaken and the findings are that there is no predicted interference to FM radio services, no interference issues with reception of satellite TV and radio broadcast services, and no issues with radio communications including radar beacon, VHF, UHF, microwave radio links, land mobile radio and mobile telephone services.

Risks of interference to television reception at all the nearby homesteads are low, except for one known potential future residence to the south of the wind farm site. Once firm building plans for the residence are made available, Verve Energy can work with the land owner to determine the actual impact and possible solutions.

Electromagnetic interference is further discussed in Section 8.10.

6.4 Vegetation and Fauna

Mapping and identification of significant flora and fauna. Construction vegetation clearance and disturbance, and the impact of wind farms upon birds and bats should be considered.

Flora and Vegetation Surveys were conducted by Biota in 2001, and identified that one Declared Rare Flora Leucopogon marginatus and eight Priority Flora Species exist in the area. This species were recorded in remnant vegetation, the Burma Road Nature Reserve and road verges in the area.

As the project will be constructed on cleared farm land, these species will not be affected by this project. Disturbance to native vegetation outside of the project area are to be minimised at all times. Clearing outside the project area will be strictly prohibited.

A vertebrate fauna desktop review was carried by Biota in 2002. The effect of this project on bats, birds and other fauna was predicted to be low to negligible.

Since the flora and fauna studies the site has continued to be actively used for general farming, so it is not anticipated that additional flora and fauna species will be encountered. As a result, it is unlikely that the proposed Mumbida wind farm will result in significant impact on flora and fauna in the area. Further discussion is provided in Section 8.8, and copies of the flora and fauna studies are provided in Appendix 5.

In addition, an environmental management process (see section 8.9 for further details) will be implemented to manage any environmental impacts during construction.

7.2 Local Government Requirements

7.2.1 Shire of Greenough – Town Planning Scheme No.4 – District Zoning Scheme

This is the Scheme relevant to the project area. Comments are provided below against relevant and pertinent aspects of the Scheme.

1.4 The Particular Objects of the Scheme

Object 1.4 (a) "to plan for the consolidation and expansion of the urban areas of Greenough within the Geraldton Region"

Not applicable.

Object 1.4 (b) "to protect the alignment of certain major roads"

Not applicable.

Object 1.4 (c) "to plan for the provision of adequate public utilities"

Not applicable.

Object 1.4 (d) "to protect from incompatible development, the landscape and buildings comprising the historic Greenough Hamlet and the Greenough Flats"

This development is remote from the historic Greenough Hamlet and is to the east of the Greenough Flats.

Object 1.4 (e) "to enable to development of non-urban areas".

This project fits well within this objective.

2.1 and 2.2 Zoning and Zone Uses and 6.2 Applications for Special Approval

The project area, Lots 10284 and 6944 are zoned General Farming.

The Shire of Greenough – Town Planning Scheme No. 4 - District Zoning Scheme does not provide a definition for wind farms or wind energy facilities.

In 2002 Council identified that a wind farm development on Lot 10284 as either 'Electricity Generation' or 'Fuel and Power Generation Plant'. These uses are not permitted within the General Farming zone unless special approval is given or they are permitted if they are considered incidental respectively. In the case of lot 10284 wind farm development was approved without advertising on the 29 May 2002 after the proponent had complied with all relevant legislation and undertaken public consultation within a radius of 3km and a public meeting.

Despite Scheme No. 4 not having a definition of wind farms or wind energy facilities these uses have previously been approved without additional Council advertising. The current proposal complies with all relevant legislation and has again undertaken public consultation within a radius of 3km without concerns being raised. However, if Council considers it necessary, an additional public consultation for a period of 21 days, as opposed to the minimum 14 days stated by the Model Scheme Text and in accordance with the Shire's Scheme clause 6.2 Applications for Special Approval is deemed appropriate.

3.10 General Policy for the General Farming Zone

3.10 (a) "the need to protect the economic viability of the rural land use generally"

Wind farms enhance and protect the economic viability of rural land, as they provide an alternative income source for farmers, with minimal impact on existing land uses such as cropping and grazing.

3.10 (b) "the need to preserve the rural character and the rural appearance of the area"

The proposed wind farm development is within the existing rural character and appearance of the areas, as it is co-located with the Walkaway Wind Farm.

The development will be an additional feature to the landscape which is already populated by Walkaway wind farm's fifty four turbines, and will affect views from nearby rural residences, local roads and various distant view points. The turbines will neither reduce nor mask the natural elements of the landscape, but may slightly change the viewer's point of focus. The main visual impact will occur primarily within a 5km radius of the wind farm site. Further details on Landscape Evaluation and Impact Assessment can be found in Section 8.1 and Appendix 7.

3.10(c) "the need to ensure that the existing standard of roads, water and electricity supply and other services is sufficient for the additional demands that the proposed development would create

The proposed wind farm development will meet its own needs in terms of roads, water and electricity supply.

A Traffic Management Plan will be produced for the project in consultation with the City of Geraldton-Greenough, Shire of Irwin and MRWA. The Traffic Management Plan will review the existing public road network to the proposed site, type and number of vehicles during the construction period and operational phase including any statutory and permit requirements for access on local road networks. The Traffic Management Plan will identify any road intersection upgrades thought necessary to accommodate oversized vehicles, additional traffic or site access requirements, whether temporary or ongoing and produce a timetable for implementation of and works identified to be undertaken. Part of the Plan will include a condition survey (Dilapidation Report) of the public roads utilised during the transport of oversized loads. Further details are provided in Section 8.4.

3.10 (d) "The need to ensure that water supply standards similar to Clause 3.9.3 are met"

Any buildings within the proposed development will meet water supply standards requirements where required.

3.11 Additional Dwellings

The proposal does not include the construction of any dwellings within the project area.

4.3 Places of Heritage Value and Historic Places

The proposal does not impact on any known places of Heritage Value and Historic Places. An Environmental Management Plan will be implemented to deal with any items of heritage value are discovered. See Section 8.9.9 for further details.

7.2.2 Shire of Greenough – TPS No.4 –Previous Development Approval

A wind farm development has already been approved on Lot 10284. This was approved by the Shire of Greenough 29 May 2002 and was for a 50 turbine wind farm with a generation capacity of up-to 60MW on Lot 10284.

On receiving approval construction did not proceed immediately due to the State government deciding not to fund the project in order to allow greater private sector investment and competition in energy generation infrastructure. Following this to further enhance competition in the sector Western Power was disaggregated into four separate entities, including Verve Energy who was given ownership of the project.

In 2008 Verve Energy was able to proceed and reviewed the project status. The review identified the need for a new turbine supplier as the original supplier could no longer supply turbines for the project, and also the potential to increase the wind farm from 60MW (Max) to 90 MW (Max) as additional network access is being negotiated with Western Power.

The inclusion of a new turbine supplier employing the latest wind turbine technology would result in a reduction in the number of turbines from 50 to a maximum of 42 and allow for an

increase in maximum power output from 60MW to 90 MW. To cater for these new turbines the project would also be extended to cover Lot 6944.

The new wind turbines would have a tower height increase from 65m to 85m and a blade length increase from 22m to up to 50m. Despite an increase in size there will be fewer turbines.

In the context of a new turbine supplier and increased network access Verve Energy considers that the project development approval for lot 10284 has not lapsed as:

1. the Scheme or the development approval conditions did not specify an expiry date;

2. Lot 10284 is still proposing up to a 60 MW wind farm with a revision to the turbine type proposed and not significantly changing the projects impact;

3. the project generally complies with the original Shire of Greenough conditions of approval for Lot 10284;

4. although construction has not commenced since approval in 2002 valid state government directives have caused the project to be delayed; and

5. the project is still consistent with the objective of orderly and proper planning as:

i. the City's town planning scheme provisions has not significantly changed since the approval was granted;

ii. the project is consistent with new state government planning and environmental guidelines, such as Planning Bulletin 67 2004, in particular regarding noise and visual impact; and

iii. since the project was approved in 2002 the Walkaway wind farm has been built and approval granted for an extension without public environmental concern.

Whilst it is Verve Energy's consider opinion that the previous approval in respect of up to 50 turbines and up to 60MW on Lot 10284 has not lapsed, it is understood and appreciated that the City of Geraldton-Greenough has a different view. In this context Verve Energy submits full details of the revised project for Council's consideration.

Compliance with original conditions of approval

As discussed above, a review is provided of how the current project meets the previous development conditions.

1 Contribution by the applicant towards the upgrading of the road system, used by transport vehicles accessing the Mumbida Wind Farm site, to the satisfaction of Council's Director of Engineering Services and Main Roads WA;

A Traffic Management Plan will be produced for the project in consultation with the City of Geraldton-Greenough, Shire of Irwin and MRWA. The Traffic Management Plan will review the existing public road network to the proposed site, type and number of vehicles during the construction period and operational phase including any statutory and permit requirements for access on local road networks. The Traffic Management Plan will identify

any road intersection upgrades thought necessary to accommodate oversized vehicles, additional traffic or site access requirements, whether temporary or ongoing and produce a timetable for implementation of and works identified to be undertaken. Part of the Plan will include a condition survey (Dilapidation Report) of the public roads utilised during the transport of oversized loads. Further details are provided in Section 8.4.

2 The submission of building plans for each of the fifty (50) Wind Towers to the satisfaction of Council's Director of Health and Building;

In accordance with Council's statutory requirements building plans for the proposed turbines (Max 42) will be submitted for approval prior to construction.

3 Compliance with the requirements of the Department of Environmental Protection, including an ongoing compliance noise monitoring system;

Verve Energy will comply with the requirements of the Department of Environmental Protection. An ongoing compliance noise monitoring system is not currently a requirement but Verve Energy can implement this if and when required.

4 The provision of a Tourist Viewing Platform, by the applicant, at the commencement of the project, to cater for expected local and tourist interest in the Wind Farm to the satisfaction of Council's Director Planning & Development;

An existing tourist viewing platform has been previously established at Walkaway wind farm, and Walkaway II has proposed to upgrade of these facilities. Verve Energy is currently considering how best to contribute to tourism and the local community as further discussed in Section 8.6.

5 The revegetation of any areas disturbed during the construction of the Wind Turbines not required for turbine maintenance access, cable corridors or fire breaks to the satisfaction of Council's Director Planning & Development;

Verve Energy will comply with this provision. As the project will be constructed on cleared farm land, any areas not for turbine maintenance access, cable corridors or fire breaks will be rehabilitated suitable for farming use. See Section 8.9 for further details.

6 The provision of Fire Breaks about the site to the satisfaction of Council and the Fire & Emergency Services Authority;

Part of the lease agreement with the landowners is that they continue to maintain fire breaks on Lots 10284 and 6944, as per the current Council and Fire & Emergency Services Authority requirements.

7 Confirmation being obtained by the applicant from the Civil Aviation Safety Authority that the Wind Turbines do not impact upon the Obstacle Height Limitation Surface for the Geraldton Airport, and compliance with any requirements that Authority may have in regards to the installation of fixed beacon lighting (if required);

CASA has been notified of the proposed wind turbine locations based on the preliminary design. The turbines are outside the Obstacle Height Limitation Surface for the Geraldton Airport and other aerodromes in the area. CASA has no objections to our proposal as long as the turbines are painted a visible white colour and appropriate notifications are carried out. CASA has not stipulated the need for aircraft warning lights.

Given the low risk, Verve Energy's preference is to not use such lights on the wind turbines as they cause a visual impact at night and the lights attract insects, which can attract birds and bats leading to the potential for avian strikes to occur.

The final location of the wind turbines will be provided to the Civil Aviation Safety Authority, Air Services Australia, WA Country Airstrip Guide; and Royal Australian Air Force prior to construction commencing.

8 That all ancillary buildings (e.g. sheds, maintenance buildings) associated with the Wind Farm are to clad in materials of an earth colour range to the satisfaction of Council's Director Planning & Development; and

Verve Energy will comply with this requirement.

9 Confirmation being supplied by the applicant that they have advised the RAAF Base at Pearce of the development and its potential affect on low flying training flights conducted in this area.

The Royal Australian Air Force will be notified of the project and confirmation provided.

7.2.3 City of Geraldton Greenough Local Planning Strategy (Greenough) October 2008

*As per the Local Planning Strategy Map (Greenough) October 2008, the project location is shown as **Rural** and is marked for **Water Resources**.*

Section 4.6.1 of the Strategy states "Detailed planning for the rural areas of the City of Geraldton-Greenough is included in the Local Rural Strategy." Therefore discussion on rural developments is discussed below in Section 7.2.4.

The following points are worthy of note in relation to this Strategy:

5.5 COMPATIBILITY WITH STATE PLANNING STRATEGY

5.5.2 Environment

Objective: To protect and enhance the key natural and cultural assets of the State and deliver to all Western Australians a high quality of life which is based on environmentally sustainable principles. · Increasingly use energy sources that have minimal impact on the environment.

The Local Planning Strategy indicates that urban and rural residential development is best located adjacent to Geraldton. This leaves the remainder of the former Shire area particularly the inland hilly areas to be further assessed for their suitability for the development of sustainable energy production such as wind farms and solar generation.

The Mumbida Wind Farm fits well with the Local Planning Strategy as the proposed project is located on the inland hill areas advocated.

5.5.4 Economic

Objective: To actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.

Make allowance for the needs of new industries and technologies.

This is a difficult principal to achieve in that we do not know what the requirements for new industries and technologies will be. However, the Local Planning Strategy provides the flexibility for new industries and technologies to be considered. Specifically, the Strategy encourages agricultural diversification and tourism, where appropriate. A large wind farm has been developed east of Walkaway. There are suitable power and water supplies and services, including access to mobile and internet telecommunication networks, to accommodate future urban and industrial growth in the former Shire area.

The Mumbida Wind Farm is supported by this principle. It encourages agricultural diversification by providing an alternative revenue stream for farmers, whilst minimising impact on existing agricultural activities. Being co-located with the Walkaway Wind Farm, it also adds to the "wind farm" tourism aspect of the area. Further discussion on tourism aspects is provided in Section 8.6.

7.2.4 City of Geraldton Greenough Local Rural Strategy October 2008

As discussed above in regards to the Local Planning Strategy, the Mumbida Wind Farm falls within an area classified as Rural. Commentary is provided below on key aspects of this Strategy.

4.2 OBJECTIVES

The objectives of the rural strategy are:

¨ To ensure the unfettered operation of the agricultural industry whilst managing the land resource upon which that industry is based in a sustainable manner.

Due to the relatively small development foot print of the wind farm (e.g. 50 Ha of 3200 Ha) agriculture is mostly unaffected due to this development. In addition, there has been consultation with affected landowners on issues such as internal wind farm road alignments to further reduce the effect of this development on agriculture.

The land resource will continue to be managed by existing landowners.

¨ To ensure areas of significant landscape and environmental value, and places of heritage value are conserved and enhanced.

A visual Landscape Evaluation and Impact Assessment has been undertaken which has shown no significant impact on landscape value. See Section 8.1.1 for further details.

The Mumbida Wind Farm is not considered to adversely affect the environmental value of the area, as the project will be constructed on clear and open farmland (e.g. currently a highly disturbed environment).

The proposal does not impact on any known places of heritage value and historic places. An Environmental Management Plan will be implemented to deal with any items of heritage value are discovered. See Section 8.9.9 for further details.

¨ To provide for the subdivision and development of rural land in appropriate areas.

Not applicable.

¨ To encourage tourism development in appropriate areas.

As previously stated, being co-located with the Walkaway Wind Farm, this project adds to the "wind farm" tourism aspect of the area. Further discussion on tourism aspects is provided in Section 8.6.

¨ To allow for the diversification of rural activities.

Wind farms enhance and the protect the economic viability of rural land, as they provide an alternative income source for farmers, with minimal impact on existing land uses such as cropping and grazing.

¨ To develop and promote environmental management principles for rural land uses.

Not applicable. Existing rural land uses to continue around the relatively small development footprint of the wind farm.

¨ To encourage and promote the development of aquaculture industries.

Not applicable.

4.4 SAND PLAIN

4.4.4 Objectives

The following are the principal objectives:

¨ To retain the land for agricultural pursuits

As previously stated, due to the relatively small development foot print of the wind farm (e.g. 50 Ha of 3200 Ha) agriculture is mostly unaffected due to this development.

¨ To obtain a greater proportion of perennial crops and wind breaks to reduce the potential for soil erosion.

Current farming practices to continue around the wind farm development.

¨ To encourage vegetation corridors of native plants to link areas of remnant bushland and expand areas of remnant vegetation, such as along roadsides and around nature reserves.

This project will not affect the existing vegetation corridors in the area.

¨ To promote the use of alley patterns of commercial or feed crops such as tagasaste, pines (Pinaster), native oil crops, honey plants or native shelter belts.

Current farming practices to continue around the wind farm development.

¨ To plant poorer soils in suitable rainfall areas such as the leached sands with tagasaste, pines (Pinaster) or other suitable plants.

Current farming practices to continue around the wind farm development.

¨ To prevent the future clearing of remnant vegetation.

The property on which the Mumbida wind farm would be developed is already extensively cleared for farming. Minimal additional clearing would be required with negligible change to the remnant vegetation that exists in the current landscape.

7.2.5 City of Geraldton Greenough Local Planning Scheme No.5 District Scheme (Greenough) October 2008 DRAFT

This scheme is in DRAFT form, has been out for public comment and is not currently enforced. Therefore this application is not subject to this scheme. Nevertheless it is worth discussion as this Scheme reflects the direction being taken by the City of Geraldton Greenough. The following comments are made:

1. *The aims (objectives) of the Scheme are proposed to change, but are still generally compatible with the proposed wind farm development including the following aim which is encouraging of wind farm developments, "to promote the sustainable use of rural land for agricultural purposes whilst accommodating other rural activities."*

2. *The project area, is now within the 'Rural' zone, as opposed to General Farming. The general requirements apply to these two zones.*

3. *The Use Classes of 'Electricity Generation' or 'Fuel and Power Generation Plant' are no longer listed in Table 1 Zoning Table. There is no longer an appropriate Use Class for power generation, wind farms and the like, and therefore the provisions of Clause 4.4.2 and 4.5 would apply.*

4. *If Clause 4.4.2 required the application to be advertised then the provision of Clause 9.4 would apply, and the same arguments put forward above in Section 7.2.1 apply.*

8 Feasibility Investigations

8.1 Visual

8.1.1 Visual Assessment

Significant work has been performed by Verve Energy during the feasibility study to assess the visual effect of the proposed Mumbida facility. Appendix 7 contains the Visual Landscape Evaluation and Impact Assessment. The visual impact assessment and resultant management measures are provided below:

> *The property on which the Mumbida wind farm would be developed is already extensively cleared for farming. Minimal additional clearing would be required with negligible change to the remnant vegetation that exists in the current landscape.*
>
> *Due to the favourable wind conditions of the region, the Greenough area is not new to wind farm development. The development will be an additional feature to the landscape which is already populated by Walkaway wind farm's fifty four turbines, and will affect views from nearby rural residences, local roads and various distant view points. The turbines will neither reduce nor mask the natural elements of the landscape, but may slightly change the viewer's point of focus. The main visual impact will occur primarily within a 5km radius of the wind farm site.*
>
> *The planning of Mumbida wind farm has taken into consideration a range of options for minimising and/or mitigating the development's visual impact. The features affecting the visual impact of a wind farm include:*
>
> - *Sensitivity of a location*
> - *Visibility of the development for neighbouring property and general public and visibility of ancillary equipment*
> - *Layout and size of wind turbine equipment*
> - *Colour of the wind turbines*
>
> *The Mumbida wind farm is proposed to be located on large private agricultural crop land in a sparsely settled rural area. Main public roads are set back from the site and the community will mostly have distant views of the wind farm.*
>
> *Relatively small areas of earthworks will be required for the installation of the turbine footings and substation. Power and control cables will be installed underground either in trenches or direct buried. All excavations made will be backfilled and revegetated sympathetic to current environmental conditions. The approximately 6km span of overhead transmission line connecting the wind farm substation to the State's electricity grid will have some visual impact, but no more so than existing power line infrastructure in the vicinity (existing transmission lines and plans to install additional transmission lines connecting Perth to Geraldton and surrounds). Occupants of homesteads surrounding the property are not new to wind turbines and are fully aware of the visual stature and noise levels that they provide.*

The number of blades, rotor diameter and height of the wind turbines are determined by technical and commercial constraints. Whilst Verve Energy has yet to select a final design, due consideration has been given to the short listed turbine suppliers. Neither the small variation in hub heights and rotor diameters nor the variation in turbine numbers from 34 to 42 will have very little, if any impact on the visual amenity of the overall wind farm development.

The preliminary location patterns of the wind turbines were selected to not only take advantage of prevailing winds for advantageous energy yield, but to also reduce excessive cluttering visually and to minimise shadow flicker.

The colour and gloss of the turbines has been chosen to create a more pleasing visual outcome, to better blend more naturally into the horizon as seem from a distance, to minimise blade glint, and to be visibly obvious to aircraft during the daytime. There will be no large visible logo or advertisements on the turbines. Any logos will be kept small compared to the overall size of the turbines. There is also no intention to place red bands on the blade for aircraft warning or aircraft warning lights on the nacelles, further reducing their visual impact. Note: Whilst this is our intent, and is consistent with our current discussions with the Civil Aviation Safety Authority (CASA), it is out of our control in the future if CASA insist on these inclusions in the wider interest of public safety.

Note: This Visual Landscape Evaluation and Impact Assessment for the Mumbida wind farm has not taken into consideration future wind farm development as layout details of Walkaway II Wind Farm are unknown, and certainty that this project will be proceed as planned is also unknown.

The following management measures will be implemented by Verve Energy to minimise visual impact from this wind farm:

1. The final design/layout of the wind farm will be given due consideration to reduce excessive cluttering visually and to minimise shadow flicker.

2. The colour of the wind turbines shall be RAL 7035 (pale grey) or similar and non-gloss.

8.1.2 Shadow Flicker

According to the Department of Business Enterprise & Regulatory Reform in the UK, Shadow flicker occurs when a particular combination of conditions coincide in specific locations at particular times of the day and year. It happens when the sun is low in the sky and shines on a building from behind a turbine rotor. This can cause the shadow of the turbine blades to be cast on the building, which appears to flick on and off as the turbine rotates. When this flicking shadow is viewed through a narrow opening, it is known as shadow flicker. Shadow flicker only occurs in relative close proximity to sites.

Frequencies that produce disturbance and nuisance to people lie above 2.5 hertz, which is well above the maximum frequency effect from turbines, which is usually under 1 hertz and therefore well below that considered to be the cause of nuisance. In addition, at a distance of 10 rotor diameters (equivalent to 800 to 1000 metres), a person should not perceive a wind turbine to be chopping through sunlight, but rather as an object with the sun behind it.

In the case of the Mumbida wind farm, the nearest resident to any turbine is greater than 1 km, so shadow flicker will not be an issue for this project.

8.1.3 Glare / blade glint

Similar to shadow flicker, blade or tower glint occurs when the sun strikes a rotor blade or the tower at a particular orientation. This can impact a community, as the reflection of sunlight off the rotor blade may be angled toward nearby residences. Blade glint is a temporary phenomenon for new turbines only, and typically disappears when blades have been soiled by dust and dirt after a few months.

In order to reduce this effect, the proposed turbines will have blades of non-gloss pale grey colour that will reduce the potential for glare to occur.

8.2 Wind Turbine Noise

According to Rogers and Manwell (2002), noise is defined as any unwanted sound. The effects of noise on people can be classified into three broad categories:

1. Subjective interferences including annoyance, nuisance and dissatisfaction
2. Interference with activities such as speech, sleep and learning
3. Physiological effects such as anxiety, tinnitus and hearing loss

In almost all cases, sound levels associated with wind turbines produce noise effects only in the first two categories.

Operating noise produced from wind turbines is significantly different in level and nature to most large scale power plants. The wind turbines at Mumbida are sited in a rural farming area that already has a corresponding ambient noise character. While noise may be a concern to people living immediately adjacent to the wind farm, a lot of the noise emitted from the turbines will be masked by ambient or background noise or the wind itself.

Wind turbines generate noise from various aerodynamic and mechanical sources. Aerodynamic noise originates from the flow of air around the blades and generally increases with rotor speed. Aerodynamic noise is typically the largest source of wind turbine noise. Mechanical noise originates from the relative motion of mechanical components and dynamic response, such as; gearbox, generator, yaw drives, cooling fans and auxiliary equipment.

Wind technology has advanced significantly and wind turbines are much quieter than they were 15 to 20 years ago. Noise from wind turbines still raises public concern, however, and thus Verve Energy has commissioned independent noise modelling by a recognised expert to ensure that noise levels are within allowed limits.

Verve Energy engaged consultant SVT Engineering to undertake an Environmental Noise Assessment for the Mumbida wind farm. A noise model of the proposed wind farm was undertaken using SoundPLAN, across a range of wind speeds for the worst case conditions (i.e. wind blowing from the source to the receivers). The resulting report for the Suzlon S88 are provided in Appendix 6.

Note: If a different turbine model (such as a GE 2.5 xl) is installed, then the noise modelling will be reviewed to ensure compliance (e.g. 35dB(A) noise contours will be no greater than the results presented here) The Suzlon S88 noise contours are considered worst case.

The results were assessed according to the Wind Farms Environmental noise guidelines (interim), December 2003, EPA South Australia and the WA Noise Regs 1997.

The report shows that there is compliance with the above regulations and guidelines at all surrounding noise sensitive premises without the need to consider background noise (e.g. noise levels are 35 dB(A) or less across the range of wind speeds modelled).

The only exception is the Marloo homestead on Lot 6944, which is within the wind farm area lease area where the predicted maximum noise levels is ~40 dB(A). This homestead is currently not being used for residential purposes. In addition to ensure that this is the case in the future, the lease agreement with the landowner (E Hamersley) for the whole of Lot 6944, only allows normal farming activities to occur on the property, which excludes residential dwellings. There is therefore no noise issue at this premise.

Noise buffer easements are being negotiated with effected landowners (as discussed in Section 5.2) consistent with the above noise modelling results. By Verve Energy negotiating the noise buffers with nearby landowners that will be registered on the title of Lots involved, we can ensure minimal disturbance into the future.

Other than the wind turbines, there will be limited noise associated with light vehicle movements, and routine maintenance tasks being carried out by site personnel. There may be increased noise associated with non-routine maintenance (such as the replacement of blade, generator, etc) but this events do not happen often and will be managed separately to ensure compliance with the Environmental Protection (Noise) Regulations 1997 (WA Noise Regs 1997).

Construction noise is discussed in section 8.9.2.

8.3 Community Consultation

8.3.1 Background

Regardless of where they are sited, wind farms typically create debate particularly by those directly affected. The community of Walkaway and surrounds have lived with a wind farm for 3 years and therefore can make an informed judgement regarding the proposed Mumbida Wind Farm.

In mainland Europe where there are hundreds of wind farms, turbines are an accepted part of the landscape. Countries such as Denmark and Germany have a large portion of their power generated by wind turbines. The environmental benefits are the primary reason for these installations.

Some countries have had different experiences. In the United Kingdom, wind farms have a very tough time gaining statutory approval regardless of where they are sited primarily due to vocal opposition. This opposition claims that wind turbines are destroying their natural “British” landscape, which wind farm supporters consider strange siting the fact that there were thousands of wind-mills operational in Britain at the end of the 1800’s. Much of the

opposition is based on personal opinion rather than factual advice, as independent opinion surveys of communities living with wind turbines in Britain show that such opposition is ungrounded.

Australia is somewhat fortunate in starting the use of wind turbines relatively late, as problems associated with early wind farm developments have largely been addressed and the methodologies and technical expertise is now available to design them appropriately. A significant proportion of our energy can also now come from a moderately small number of turbines. For example, the proposed Grasmere wind farm of six machines when combined with the Albany wind farm of 12 turbines will supply over 80% of the electrical demand of Albany. Fifteen years ago that would have required more than 100 machines. Current turbines are also quiet and the techniques to lower their visual effect are well understood and routinely used.

Australia is also fortunate that its early wind farms were sensitively developed and Esperance is a good example of this. Western Power's experience in Esperance is of a community which lives in harmony with their wind farms. There was very little opposition to either of the two wind farms, despite their proximity to one of the region's premier tourist routes (the "tourist loop") and development in an area of great natural beauty. Some people in Esperance do not like the wind farms but on the whole they are well accepted.

In Denham at Shark Bay, community acceptance is also high with a renewable energy installation fitting well with that region's World Heritage status. Negative comments have only been made as to the possibility of aircraft collisions and the fact that the turbines are hard to see from the ocean.

8.3.2 Stakeholder Management

For each major project that Verve Energy undertakes a stakeholder management plan is implemented. This plan covers internal and external stakeholder management, communication activities, media management and issues management. The plan aims to improve stakeholder awareness about the project both in terms of its scope and continual progress throughout the development and implementation phases of the project. The plan delivers the following outputs:

(i) stakeholder briefings and presentations;

(ii) media relations;

(iii) advertising;

(iv) production of printed materials;

(v) internal communication material;

(vi) direct mail to stakeholders;

(vii) co-ordinated public liaison; and

(viii) effective issues management.

Stakeholder briefings and presentations have been carried out with various parties including the local landowners, City of Geraldton-Greenough, Shire of Irwin, Midwest

Development Commission, Department of Environment and Conservation, Members of Parliament, Western Power, Midwest Gascoyne Consultative Committee and the Walkaway Progress Association.

Stakeholder update no. 1 was distributed to stakeholders in December 2008, and is provided in Appendix 4.

The wind farm will be visible from many locations in the area and will add to the visual effect caused by the Walkaway Wind Farm. The turbines will also make some localised noise. Verve Energy has not hidden these facts and has discussed them openly, siting the experience to date with the existing Walkaway wind farm.

Verve Energy's experience during the feasibility study is that when confronted with facts on what is proposed and why, most people are comfortable with the wind farm. Certainly there is widespread community support for it.

Verve Energy has consulted directly with most landowners within a 3km radius of the proposed Mumbida wind farm. The overwhelming majority of these landowners consulted were in support of the project. Those that could not be contacted by phone or in person have been sent information on the project, and provided with contact details.

In addition, Verve Energy made a presentation on the Mumbida wind farm project at the Walkaway Wind farm Association in early March, which allowed us to gauge wider community opinion. Of the eight attendees present, all were in support of the project.

Overall the wind farm has generated a low level of community interest. This is believed to be due to the fact that there is an existing wind farm in the area, and that there is general acceptance of this wind farm. We have not encountered and do not expect to encounter much opposition for the wind farm as the project progresses.

8.4 Construction

8.4.1 Sources of Materials

The wind turbines will be imported from an overseas manufacturer. It is also very likely that the 132/22kV power transformers and all the main 132kV outdoor and 22kV indoor switchgear for the substation will also be imported.

To incorporate as much local content as possible into the project, the turbine towers and ancillary equipment such as site buildings, power lines and structures, control equipment, cabling and bulk earthwork materials such as sand, aggregate and cement will be sourced from within Australia if feasible.

Materials for bulk earthwork, laydown areas, roads, concrete works, minor structures and associated infrastructures will be sourced from the local area.

A large amount of water will be required throughout the construction phase for concrete mixing, road construction and dust suppression. Potable water required for concrete will be around 120,000 kilolitres and bore water for road construction and dust suppression will be approximately 400,000 kilolitres. Potable water will be sourced from standpipes in the area. Agreement is in place with the landowner to extract bore water from the property.

8.4.2 Concrete Batching

Due to the vast quantities of concrete required (approximately 15,000m3) for the tower footings and substation works, an on-site concrete batching plant may be established for the duration of the works. This will minimise the transportation requirements and maximise construction efficiency.

8.4.3 Labour resources

It is estimated that there will be between 50-60 employees on-site during the construction of the roads, foundations and electrical reticulation works. Maximum labour on site is expected to peak at between 80 and 90. The majority of employees are expected to be based in the Geraldton area, and it is likely that a significant proportion of employees will be sourced locally. Where possible labour and supporting services will be sourced from the local area. This is consistent with Verve Energy's approach on past projects,

8.4.4 Safety, Health and Environmental (OSHE) Management

Verve Energy aims to promote high levels of participation in the responsible management of safety and health, to meet, and where appropriate, exceed legal and industry safety and health standards.

Amongst the wide array of State and Commonwealth legislation that impacts on safety and health, the Western Australian *Occupational Safety and Health Act 1984* (the OSH Act) and the Western Australian *Electricity Act 1945* are the principal pieces of legislation which impose statutory obligations on Verve Energy, its directors, managers and employees.

The OSH Act regulates safety and health by imposing general duties on employers and others. Breaches of these duties can result in significant penalties including fines to individuals and Verve Energy. Individuals can be imprisoned for two years in cases of gross negligence causing serious harm or death. This includes managers and directors who have personal liability under the OSH Act.

Verve Energy has an established safety and health management system that is appropriately supported by managers and employees responsible for managing the day-to-day safety and health issues. Implementation of the system throughout the business is audited annually, demonstrating that significant safety and health issues are being managed to a satisfactory level or higher.

The driving force for achieving Verve Energy's safety and health vision is the Safety and Health Policy contained in Appendix 8. The policy contains key objectives that support effective risk management, and injury and harm prevention strategies.

A systematic approach to safety and health management is used to ensure Verve Energy's duty of care obligations are met. The administration of the Safety and Health Management System assists in meeting legal requirements, and leads to sustained improvement in safety and health performance. The system structure of processes, documents and programs is consistent with AS/NZS 4804:2001 Occupational Health and Safety Management Systems. Details of the Verve Energy Safety and Health Management System are summarised below.

The Verve Energy Safety and Health Management System is designed to ensure that all management and operational practices;

- Comply with statutory and other requirements;

- Conform to Company policy; and
- Continually realise improvements in safety and health performance.

Verve Energy's Safety and Health expectations are detailed in twelve mandatory Standards listed below. These Safety and Health Standards define the minimum acceptable requirements for safety and health management, and also ensure that management practices are aligned with Verve Energy's policies and commitments.

Standard 1 - Leadership & Accountability

Standard 2 - Statutory & Other Obligations Management

Standard 3 - Safety and Health Planning

Standard 4 - Safety and Health Communication and Consultation

Standard 5 - Occupational Health Management

Standard 6 - Risk Management

Standard 7 - Safe Systems of Work

Standard 8 - Audit and Review

Standard 9 - Emergency Management

Standard 10 - People, Training & Behaviours

Standard 11 - Learning from Incidents

Standard 12 - Working with Contractors, Suppliers and Partners

An Occupational Health and Environmental (OHSE) Plan will be established for the construction stage of the project.

Verve Energy's Environmental Management System (EMS) is a structured process for assessing and managing environmental risk and achieving continual improvement in environmental performance. Our Environmental Policy encourages Verve Energy to strive for environmental excellence as the cornerstone of sustainability.

Environmental management measures are detailed in Section 8.9, and Verve Energy's Environmental Policy can be found in Appendix 9.

8.5 Transport requirements

8.5.1 During Construction

The site is located approximately 40 km south east of Geraldton. Access to the site by general construction vehicles will be via the public road network.

For special construction traffic i.e. for the delivery of wind turbine tower sections, transformer, blades and nacelles a route will be formalised during the detailed design process. Special construction traffic will consist of mainly oversized vehicles which could have loads up to 53m long. All oversized loads will require a Main Roads WA (MRWA) Oversized Vehicle Permit as well as vehicle escorts. Some will require police escorts.

A Traffic Management Plan will be produced for the project in consultation with the City of Geraldton-Greenough, Shire of Irwin and MRWA.

The Traffic Management Plan will review the existing public road network to the proposed site, type and number of vehicles during the construction period and operational phase including any statutory and permit requirements for access on local road networks. The Traffic Management Plan will identify any road intersection upgrades thought necessary to accommodate oversized vehicles, additional traffic or site access requirements, whether temporary or ongoing and produce a timetable for implementation of and works identified to be undertaken. Part of the Plan will include a condition survey (Dilapidation Report) of the public roads utilised during the transport of oversized loads.

As previously discussed, the use of a concrete batching plant will be considered, which will help to reduce the amount of wind farm generated traffic on the local road network. Concrete constituents, cement, aggregates, sand, steel reinforcement and potable water will still need to be trucked to site.

The total estimated traffic generated by the construction of the foundations and the delivery and erection of the towers and generators is detailed in the table below.

Component	Material	Total loads	Duration (weeks)	Vehicle Type
Foundation Construction				
	Aggregate and Sand	1000	24	Truck and Dog
	Cement	250	24	Semi Trailer
	Reinforcing Steel	150	20	Semi Trailer
	Water and other deliveries	150	24	Rigid and semi
	Agitator Trucks	450	24	Rigid Track
	Plant (road making, crane etc)	50	20	Semi Trailer
	Personnel and visitors	6000	28	Cars and utilities
Towers, Turbine and electrical component delivery				
	Tower Sections	200	18	Extended OD Vehicle
	Blades	150	16	Extended OD Vehicle
	Nose cones	50	16	Semi Trailer
	Nacelles	50	16	Semi Trailer
	Containers	50	16	Semi Trailer
	Electrical components	50	50	Semi Trailer

	Cranes and other major plant	50	23	Semi trailer
Other Traffic				
	Sundry	1000	50	Car/utility
	Water (Dust Suppression)	100	70	Rigid Tanker

It is appreciated that during grain harvest season (typically from October to December) the roads in the area can be well used by heavy machinery and haulage. Efforts will be made in construction planning to minimise heavy transport movements during this time. It is not currently planned for wind turbine construction works (which involves the most heavy haulage movements) to occur during this time.

8.5.2 During operation

Traffic to and from the site through the operational phase will be minimal, with only service vehicle movements generated in order to fulfil maintenance requirements. During the operational phase whilst not planned, it is possible that major items such as the turbine blades, gearboxes, etc, may need to be replaced. Accordingly the access roads and intersections will need to be maintained in a condition which will support over-dimensioned vehicles.

8.6 Tourism

Wind farms generally attract considerable attention from interested tourists, and can become tourist attractions in their own right (For example the Albany and Walkaway Wind Farms).

There is good established wind farm tourist infrastructure for the Walkaway Wind Farm, including car park, ablutions, signage and a basic shelter. It is understood that as part of the Walkaway wind farm expansion, this facility will be further upgraded and improved.

Signage is planned to be installed adjacent to the property entrance to provide interested people with information on the wind turbine and the project. The signage will also direct them to the Walkaway Wind Farm tourist facility, as this is an existing established point in the local area. The general public will be able to get a good view of Mumbida wind farm from Walkaway's existing tourist site.

It is also planned to produce a brochure that will be available within Walkaway for interested tourists.

Note: At other wind farms (such as the Albany Wind Farm) Verve Energy has generally installed tourist facilities. In this situation, it is not considered necessary as there is an existing facility in the local area to cater for interested tourist. Installing an additional facility at Mumbida is not considered an efficient use of resources. Due to the wind farm being on private land there is also not an opportunity to establish walk trails, or similar. Other opportunities will be explored to promote sustainable energy in the community, consistent with Verve Energy's corporate policies and what has been done at other sites (such as the Community Partnership program).

8.7 Heritage

A review of the Aboriginal Sites was undertaken using the Department of Indigenous Affairs, Aboriginal Heritage Inquiry System. There are no known Aboriginal Heritage sites within the project area.

A search of the Register of National Estate provided by the Australian Heritage Council was undertaken. There are no known sites of historical significance in the project area.

Environmental management measures in respect of heritage are provided in Section 8.9.8.

8.8 Flora and Fauna

From the Flora and Vegetation Survey conducted by Biota in 2001, it was identified that one Declared Rare Flora *Leucopogon marginatus* and eight Priority Flora Species exist in the area. This species were recorded in remnant vegetation, the Burma Road Nature Reserve and road verges in the area. As the project will be constructed on cleared farm land, these species will not be affected by this project.

A vertebrate fauna desktop review was carried by Biota in 2002. The following summarises the conclusions of this report:

(i) Bats - Based on the available data, it appears that the risk to bats from the proposed wind farm would not be significant.

(ii) Birds - The risk to birds is similarly not predicted to be significant, due to the following reasons:

i. The site is not located on any known migratory flyways.

ii. There are no major breeding sites or habitats for migratory species in the project area.

iii. Bird utilisation of the site itself is considered low.

iv. The low heath communities typically support species belonging to the Acanthizidae (Scrubwrens, Thornbills) and Maluridae (Wrens and Emu-wrens). These are low fliers and likely to spend most of their time within the denser heath habitat, and are therefore not at risk from the turbines.

v. Carnaby's Cockatoo (*Calyptorhynchus latirostris*)) (Schedule 1 taxa) may visit the nearby remnant vegetation to feed and may fly at turbine height when approaching or leaving. Carnaby's cockatoo is a very component day and night flyer and would generally avoid turbines (Johnstone 2002). This species is also listed as Endangered under the EPBC Act 1999.

vi. Peregrine Falcon (*Falco peregrinus*) (Schedule 4 taxa) may occur over the project area, as the Peregrine Falcon has been recorded breeding on the Greenough River (at Ellendale Pool) and has been reported over farmlands, but is considered scarce or rare in the project area (Johnstone 2002).

(iii) Other fauna - The turbines and associated infrastructure will be placed in open pasture and as such there is expected to be negligible impact to ground-dwelling fauna.

Since these studies the site has continued to be actively used for general farming, it is not anticipated that additional flora and fauna species will be encountered. As a result, it is unlikely that the proposed Mumbida wind farm will result in significant impact on flora and fauna in the area. However, we do have an environmental management process (see section 8.9 for further details) should environmental issues arise.

Copies of the flora and fauna studies are provided in Appendix 5.

8.9 Environmental Management

As part of the Occupational Safety Health and Environment (OSHE) management plan, environmental management measures will be put in place. It will provide a framework to ensure that the environmental disturbance at the site is minimised during the construction phase of the project. All personnel involved with site works over this period are to follow the instructions of the plan, including those from Verve Energy, and its sub-contractors. The document defines the critical environmental issues, how they will be managed and whose responsibility it is to ensure that this occurs.

The Environmental Management Plan will cover the following areas, which are detailed further below:

(i) General site management (including waste disposal)

(ii) Construction noise management

(iii) Weed and soil hygiene

(iv) Flora and fauna

(v) Ground water

(vi) Topsoil management and rehabilitation

(vii) Dust suppression

(viii) Community relations and visitor safety

(ix) Aboriginal and Archaeological heritage

(x) Fire management

8.9.1 General site management (including waste disposal)

The objective of general site management is to ensure that the site works is generally well managed with regards to potential environmental impacts. The following measures will be put in place:

1) Disposal of refuse is to be in accordance with the City of Geraldton-Greenough by-laws. No refuse is to be deposited within the boundaries of the project area. All personal refuse is to be carried and disposed of off site.

3) All personnel are prohibited from bringing pets, traps, firearms or other projectile weapons into the project area and the lighting of fires is prohibited at all times.

4) Speed limits are to be limited to a maximum of 40 km/hr while in the project area and according to ground conditions and posted speed limits on other roads.

5) All vehicles are to use existing roads and access tracks as far as practically possible.

6) Works are only to occur in the areas shown on detailed site drawings. No disturbance outside of these designated areas is allowed.

7) The site will be left in a clean and tidy condition at the end of each working day.

Contractual clauses will be implemented with sub-contractors to ensure compliance, and impose penalties if necessary.

8.9.2 Construction noise management

The primary risk of noise pollution is during project construction activities. To minimise the impact of background noise, a noise mitigation plan will be implemented:

1) Site activities are to begin no earlier than 7am and where possible are to cease by 7pm Monday to Saturday and 9am to 7pm Sundays and Public Holidays to limit noise (as required).

2) Vehicles and equipment are to be properly maintained so as to minimise their noise characteristics.

8.9.3 Weed and soil hygiene

Weeds can impede agricultural production, compete with and displace native vegetation, become a visual blight on the landscape and increase fire hazard. Weeds are classed as either “declared” or “pest plants” by regulations and require specific actions to be taken. Transport corridors such as roads are a means of spreading weeds, either by road construction and maintenance activity or by actions of road users.

To ensure that weeds or soil borne pathogens are not introduced to, spread within, or beyond the project area, a weed and soil pathogen control program is to be implemented:

1) To control the spread of weeds, disturbance to existing vegetation and soil will be minimised to limit weed invasion.

2) To ensure that no new weed species or soil borne pathogens are introduced, all vehicles, machinery and equipment brought into the project area are to be in a clean condition. Where necessary, plant and vehicles are to be cleaned down before entering the project area.

3) Any requirement for imported fill material is to be sourced from soil pathogen, dieback and Armillaria free locations.

4) Site activities are to be conducted under dry soil conditions as far as practicable to minimise the risk of soil pathogen spread.

5) If new weed infestations are discovered that are attributable to project construction activities, then treatment will be organised using acceptable methods.

8.9.4 Flora and fauna

Impacts on flora in the project area are to be managed and minimised through the implementation of soil pathogen and weed hygiene, clearing controls, topsoil management, rehabilitation and fire management.

Local fauna that may inhabit the area will be protected through the implementation of general site management.

The following measures will be implemented specifically in respect of flora and fauna:

1) Firearms, pets and feral fauna will not be permitted in the project area.

2) Burning will be prohibited in the project area at all times.

3) DEC is to be contacted if any fauna is injured or active nests disturbed during construction.

4) DEC is to be contacted to remove any fauna that is in the project area and at risk of injury during site works.

5) Disturbance to native vegetation outside of the project area to be minimised at all times.

5) Only authorised personnel are to undertake clearing within the areas marked by tape and as shown on detailed site drawings.

6) Clearing outside the project area will be strictly prohibited.

8.9.5 Ground water

Construction activities have the potential to contaminate the ground water through the use of the fuel, oil and other potential contaminates required for construction.

Hydrocarbon contamination is the greatest risk on site given that fuel, oil and other potential contaminants will be required for various activities. As such, all likely contaminants will require appropriate storage and handling procedures to ensure that groundwater contamination does not occur. All Contractors/site personnel are to adopt the following protocol during the works with regards to this issue:

1) Storage of contaminants such as fuel, oil, and other chemicals is to be done off site (preference) or restricted to designated areas. As a minimum, this should comprise a bunded compound, lined with geotextile or other suitable impervious material and/or utilise double skinned tanks.

2) Suitable clean-up materials must be retained at these storage areas and with all vehicles where a possibility of leakage may occur. Personnel are to be adequately trained in clean-up procedures.

3) All substantial spills greater than 5L are to be reported immediately to the Site Manager.

4) In the event of a spill, clean up including excavation of contaminated soil if required is to be affected immediately, with the contaminated material removed within a maximum

of 2 hours. Removed contaminated material is to be disposed of in a location approved by the City of Geraldton-Greenough. Contaminated soils from substantial spills are to be collected and may be stored in a mobile bund for disposal.

5) Portable plant is to be fitted with internal containment to ensure fuel leaks are contained and prevented from leaking into the ground. Plant is to be inspected regularly for signs of fuel or oil leaks; any leaks are to be rectified immediately.

6) The refuelling of mobile plant and other equipment within the project area shall be avoided where ever possible. If refuelling of mobile plant and other equipment within the project area is required personnel shall man this refuelling at all times.

7) The Site Manager is to maintain a record of any spillages that occur and subsequent actions taken.

The principle potential risk from the installed wind turbine to ground water contamination is through oil based liquids. The wind turbine proposed does not require significant quantities of oil based liquids in their operation or maintenance, limited to the oil required to lubricate moving parts in the nacelle (top section) of the wind turbine.

The electrical interconnection of the wind turbines will require pad-mounted transformers which will contain insulating liquid. The transformer is sealed and in widespread use throughout Western Power's SWIS. From Western Power and Verve Energy's experience with these type of transformers, significant leaks from the transformer is rare and in nearly all cases where a leak is experienced, the leak is limited to seep from the transformer bushings. It is proposed to inspect the wind turbines and transformers for any signs of leakage during the routine maintenance program for the wind farm.

8.9.6 Topsoil management and rehabilitation

Any areas that have been disturbed during project construction activities that are not required for ongoing maintenance will be rehabilitated by the re-establishment of topsoil adequate for agricultural use. It is not expected that native vegetation will be disturbed during construction, so rehabilitation of native flora is not necessary.

Drainage and storm water disposal from the access and service roads and hardstands will be managed to minimise erosion potential. Service roads will be designed with minimum cut and fill to avoid erosion from stormwater run-off, with verge sections subject to erosion potential treated with rock and channel drainage.

The management of cleared vegetation, topsoil and overburden during site activities is important in ensuring that the disturbance area recovers as completely as possible. Topsoil management is to follow the plan below:

1) Topsoil is to be recovered to a depth of 150 mm and formed into separate temporary stockpiles or windrows. Topsoil stockpiles are not to exceed approximately 1.5 m in height to minimise loss of seed viability and microbial activity.

2) Any compacted or disturbed area requiring rehabilitation will be deep-ripped to a depth of 150mm to facilitate root and water penetration, and recovered with stored topsoil. This topsoil must then be stabilised using an appropriate means to prevent wind and water erosion.

3) If erosion problems have developed as a result of temporary constructions, then appropriate remedial measures are to be implemented to protect against further erosion such as the use of mulch or vegetation or geo-matting.

6) At the completion of the works, the Site Manager is to carry out an assessment of the topsoil management actions and identify any additional requirements.

In the event that un-authorised vegetation disturbance occurs then rehabilitation will be required.

8.9.7 Dust suppression

Throughout the construction phase, some amount of dust will be generated by moving vehicles and construction plant along unsealed public roads and internal access roads.

Dust suppression will be carried out on the internal access roads and unsealed public roads as required during the drier months of the year to control any excessive generation of dust. To ensure that fugitive dust generation is adequately controlled:

1) Where necessary, ensure unstable construction areas and other point sources are regularly wetted down during construction activities.

2) Stabilise the surface of any large areas that will be exposed for significant periods.

3) Ensure that applied water for soil wet-down does not generate runoff from any stockpile.

4) Monitor and review dust management strategies if excessive dust starts to be generated.

8.9.8 Community relations and visitor safety

The proposed Mumbida wind farm is to be located entirely within private land. As a result, access to the wind farm site by the general public during construction and operation will be restricted. This is also to maintain security of the private landowner's crops and livestock and personal possessions and to protect the owner from public liability risk.

8.9.8.1 During construction

The wind farm is expected to generate local interest during construction. It is envisaged that there may also be media interest.

Verve Energy has developed a Stakeholder list during the feasibility study and will continue to keep people informed of the project during construction. Notices will be posted on local notice boards to inform the general public.

Measures to manage public safety include:

1. Public entry to the site will be strongly discouraged during construction due to the potential safety risks. Measures include safety signage, fencing, gates, etc will be implemented.

2. All visitors will be required to report to the site office. If visitors are allowed to enter the site, they will need to inducted to the OHSE plan prior to entering the site, wear personal protective equipment (PPE) and accompanied at all times.

3. Site workers will be inducted to the OHSE plans, which will measures to ensure that members of the public are not put at risk by construction activities.

4. All media interest will be directed to the Site Manager or delegate.

8.9.8.2 During operation

Public access will continue to be restricted during the operation of the windfarm due to the following reasons:

1. The wind farm is on private property. The landowner will continue to use the property for agricultural purposes, and hence it is not desirable to have public access.

2. The presence of high voltage equipment.

3. Hazards for members of the public when maintenance is being carried out on wind turbines. Maintenance will occur regularly throughout the year, as maintenance is carried out on a rotational basis.

All visitors will be required to report to the site office. If visitors are allowed to enter the site, they will need to go through a OHSE induction prior to entering the site, wear personal protective equipment (PPE) and accompanied at all times.

8.9.9 Aboriginal and Archaeological heritage

Verve Energy and its Contractors will meet their obligations under the Aboriginal Heritage Act (1972-1980).

If any personnel identify any material suspected to be of aboriginal or archaeological significance during site activities, works will be suspended immediately and the Site Manager informed. The Site Manager will contact the Department of Indigenous Affairs and will suspend any further work in this area until advise from the Department of Indigenous Affairs has been received.

8.9.10 Fire Management

Due to the proposed wind farm site being located in a farming area, the potential for bushfire in the drier months is a risk during construction. A Bushfire Management Plan will be prepared including the notification of the local bushfire control officer prior to construction. Advice from CALM will be sought as to the appropriate further requirements.

To ensure that the risks of fire are minimised during construction site activities and that adequate fire response equipment is available in the event of a fire, the following steps will be implemented:

1) No fires to be lit at any time within the works area.

2) Contact the Geraldton Fire Brigade prior to carrying out any construction activities involving naked flames.

3) Prior to carrying out any construction activities involving naked flames, determine what the current fire danger level is for the area. No naked flames on very high or extreme fire danger days.

4) In the event of an uncontrolled fire, call Fire and Emergency Services (000) immediately.

5) In the event of any fire, notification must be made immediately to the Site Manager.

6) Plant to be made available to assist with fire control in the event of fire.

8.10 Electromagnetic Interference (EMI)

Verve Energy engaged consultant Gibson Quai AAS Pty Ltd to conduct a study to determine whether there is any likelihood that the proposed wind turbines will cause interference to the broadcasting and radio communications services in the nearby area, and if so to identify the areas of interference, the effects and any steps that could be taken to minimise the impact of the wind turbines.

The study examined the following areas:

- Existing TV services
- Existing FM radio services
- Existing radio communications services
- Modelling of TV and radio reception interference caused by wind turbines
- Modelling of radio communication reception interference caused by wind turbines
- Results of investigations into possible interference caused by wind turbines

The findings are as follows:

- No predicted interference to the FM radio services.
- No interference issues with reception of satellite TV and radio broadcast services.
- No issues with radio communications including radar beacon, VHF, UHF, microwave radio links, land mobile radio and mobile telephone services.

Risks of interference to television reception at all the nearby homesteads are low, except for the potential future Ward residence to the south of the wind farm site. This was due to the proximity of one of the wind turbines that could be in line with the Geraldton Broadcast Site. Once building plans for the residence are made available, Verve Energy will work with the land owner to determine the actual impact and possible solutions.

The study report by this consultant is available on request.

8.11 Conclusion

The proposed Mumbida wind farm will be a significant project for the City of Geraldton-Greenough and for Verve Energy. The Mumbida wind farm feasibility study to date has

found that a wind farm can be built at the proposed site that meets technical, social and environmental constraints imposed on it.

The Mumbida Feasibility study is yet to conclude with remaining issues relating to outstanding statutory approvals, the resolution of project financing arrangements and approval from Verve Energy's Board of Directors. However, the results provided in this document show that the project has significant merit.

For the people of the City of Geraldton-Greenough, the Mumbida wind farm will not be a significant change but a forward thinking one which represents a clean and sustainable future.

9 Acknowledgements

Verve Energy wishes to thank the proposed wind turbine suppliers, numerous groups, agencies and individuals who have taken part, commented and assisted during the wind farm feasibility study. Their time, effort and feedback is greatly appreciated.

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11 Appendices

Appendix 1 Wind Energy Background

Verve Energy has been assessing alternatives to burning coal and gas (which are "fossil fuels")[2] to supply electricity to the people of Western Australia for many years. The alternatives include renewable energy technologies that get their power from the sun, the wind, the movement of water and even from the breakdown of plant material. Unlike fossil fuels these "natural" renewable resources will never run out.

Verve Energy is particularly interested in renewable energy because of its environmental advantages. The primary driver for this is global warming which it is believed could be enhanced through the burning of fossil fuels to the point where changes to our climate are possible. Because renewable energy does not produce atmospheric emissions it does not add to this effect.

It is difficult to justify the use of renewable technologies commercially as our electrical system already delivers cheap and reliable power using techniques and methodology developed over almost 100 years. There are suitable renewable technologies available and we have the natural resources in Western Australia to use them. However, they are more expensive than conventional electricity generation technologies and some of them are still in developmental phases.

Verve Energy has invested in many renewable technologies through research and development and is at the forefront of this area in Australia. The company generates electricity from the sun and wind and is involved with investigations into other renewable energy sources. The most promising technology currently, however, is wind energy.

Wind energy is where a machine takes energy from the wind using blades and converts this to electricity. The machines that do this are called wind turbines and when several of these are placed together it is called a wind farm. Verve Energy has a good understanding of how to use wind turbines and has been doing so for 30 years. While the wind has been used for nearly 100 years to create electricity it is only in the last 20 years that the technology has matured.

In the 1980's the then State Energy Commission of Western Australia undertook a state-wide search for locations suitable for the installation of wind turbines. Part of this study involved the investigation of areas that were connected to the State's South West Interconnected System (SWIS) which extends from Kalbarri in the north, to Cape Leeuwin and Ravensthorpe in the south (including Albany) and as far as Kalgoorlie in the west. All of these places mainly rely on electricity from coal and gas fired generators with the majority of this coming from power stations at Collie and Kwinana near Perth.

The SWIS is a large electrical system involving the generation, transmission and distribution of approximately 4,000 megawatts (MW)[3] of power. Such large systems can

[2] A fossil fuel is the fossilised remains of biological material laid down over millions of years and converted through heat and pressure to a very special but ultimately exhaustible form of energy.

[3] 1 megawatt = 1 million watts, or enough energy for ten thousand 100 watt light globes

support different types of electrical generation and, in places, can accommodate large wind energy inputs as evidenced north of Perth with 170MW of wind farms currently running.

Wind energy has been Verve Energy's focus because of its maturity and relative cost. Turbines are now off-the-shelf items and there are over 20 major manufacturers. The cost of wind generated electricity has also fallen to the point where in some areas it can compete directly with fossil fuels. This is why Verve Energy has installed wind farms at Esperance (6 x 600 kilowatt (kW)[4] and 9 x 225kW turbines), at Denham (3 x 230kW turbines and 1 x 330kW turbines), at Hopetoun (2 x 600kW turbines), and at Coral Bay (3 x 275kW turbines), all of which are communities which rely on expensive diesel fuel for their power. Verve Energy has also installed wind farms on the SWIS at Albany (12 x 1,800kW) and at Kalbarri (2 x 800kW).

On the SWIS it will be some time before wind energy can compete commercially against coal fired power stations, though the environmental benefits can presently justify its use at the best sites available. The introduction of emissions trading in the coming years will also provide a mechanism for wind energy developments to compete fairly with conventional fossil fuel generation.

Verve Energy is in the planning stage for a number of large scale wind farm developments including the Grasmere (Albany expansion) and Milyeannup wind farms.

[4] 1 kilowatt = 1 thousand watts, or enough power for ten 100 watt light globes

Appendix 2 Wind Farm Technical Details

The Mumbida Wind Farm is limited in size by the available land and network access available to Verve Energy, both of which constrain the facility to potentially 90MW, land availability to a lesser extent.

Verve Energy has undertaken a feasibility design process to determine the most appropriate wind farm configuration. Whilst a specific turbine type has not been selected as yet, the wind farm layout should not differ too greatly between the various turbines. The majority of these turbines are positioned along the escarpment where the highest wind energy yield area exists with the remainder being installed further into the farm land. The proposed layouts of the wind farm are provided in Appendix 3.

The proposed turbine siting for Mumbida attempts to maximise energy yields while minimising costs associated with design constraints. Turbines are sited at the best yield locations whilst taking into consideration issues of visual, noise, environmental, land tenure and access constraints. Experience from Verve Energy's existing wind farm facilities was also used in this process.

The selected wind turbine for the Mumbida project will need to maximise the wind energy capture whilst minimising capital costs, but also to meet the electrical and control abilities required for transmission network access.

A ground truthing will be undertaken at Mumbida to ascertain the suitability of computed wind turbine sites. The ground truthing exercise optimises the wind turbine locations for energy production, and examines the suitability for hardstands and the general routes for the wind farm road.

Wind Turbines

Verve Energy is in the process of selecting a preferred wind turbine supplier, and as such this application for planning approval takes into consideration a range of potential suppliers.

The following are the technical overviews of the various turbine types currently being considered.

TURBINE MODEL	**Suzlon S88 – 2.1MW**	**GE 2.5xl – 2.5MW**	**Enercon E82 – 2MW**
Operating Data			
Rated power	2.1MW	2.5 MW	2MW
Cut-in wind speed	4 m/s	3.0 m/s	2.5 m/s
Rated wind speed	14 m/s	14 m/s	12 m/s
Cut-out wind speed	25 m/s	25 m/s	28 – 34 m/s

Hub height	80 m	85 m	80 m
Wind class	IEC IIA	IEC IIB, IIIA	IEC II
Rotational speed	15 – 17.6 rpm	5 - 14 rpm	6 – 19 rpm
Rotor			
Number of rotor blades	3	3	3
Diameter	88 m	100 m	82 m
Swept area	6,082 m^2	7,854 m^2	5,281 m^2
Pitch system	Upwind rotor with active pitch control, independent pitch system per rotor	Upwind rotor with active pitch control, independent pitch system per rotor	Upwind rotor with active pitch control, independent pitch system per rotor
Blade material	Fibreglass/Epoxy	Fibreglass reinforced plastic	Fibreglass (epoxy resin)
Generator			
Type	Single fed induction generator	Permanent magnet	Direct drive synchronous annular generator
Rated power	2100 kW	2,500 kW	2000 kW
Rated voltage	690 V	710 V	400 V
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Grid connection	Direct, with switch capacitors	Via converter	Via converter
Braking system			
Brake	Aerodynamic brake- 3 independent systems with blade pitching. Mechanical brake- Hydraulic fail-safe disc brake system.	Main brake- independent blade pitch control. Second brake system- disk brake.	3 independent blade pitch systems with emergency supply, rotor brake, rotor lock.
Gearbox			
Type	Multistage (1 planetary & 2 helical)	Multistage (1 planetary & 2 helical)	Gearless
Ratio	1:98.8/1:118.1	1:117.4	
Yaw system			
Type	Driven by 3 electrical	4 electric gear motors	Active via adjustment gears, load dependent

	driven planetary drives		damping
Bearing	Polyamide slide		Dual row tapered/single row cylindrical roller bearings
Tower			
Type	Steel tubular	Steel tubular	Steel tubular
Corrosion protection	Multicoated	Multicoated	Multicoated

Figure 2- Suzlon S88 wind turbines being installed (photo courtesy Suzlon Australia)

Figure 3 - Installed Suzlon S88-2.1MW wind turbines (photo courtesy of Suzlon Australia)

Figure 4 - GE 2.5xl wind turbine (photo courtesy of GE)

Figure 5 - Enercon E82 wind turbine (photo courtesy of Enercon)

Wind monitoring masts

Approximately 4 guy wired wind monitoring masts up to 100m in height will be permanently installed as part of the wind farm. These masts will allow the ongoing performance of the wind turbines to monitored and evaluated.

These masts will be up to 100m guy wired lattice masts, with anemometers, wind vanes and other instruments installed at various heights to enable the wind conditions at the site to be assessed.

A photo of a typical wind monitoring mast is provided below.

Figure 6 – Typical wind monitoring mast arrangement

Transmission Access

The Mumbida wind farm will connect to the Three Springs – Geraldton 132kV transmission line under a connection agreement with Western Power. Such connection involves a

formal submission of a Networks Access Application and this was undertaken by Verve Energy for Mumbida in 2001 (then as Western Power Corporation).

Following a review by Western Power in 2001 it was advised that sufficient capacity existed in the network to facilitate this connection. However, it was advised that this was no longer the case following the installation of the Walkaway wind farm. This situation remained until late in 2007 when Western Power advised that it had approval from the Economic Regulation Authority to build a new 330kV transmission line to Geraldton. The outcome of this is that sufficient capacity would exist again to facilitate the Mumbida wind farm connection.

Since this time, Verve Energy and Western Power have been in discussion regarding network access and a Network Access offer is expected from Western Power in mid 2009. This is likely to be acceptable to Verve Energy based on these discussions.

Electrical & Communications distribution

The Mumbida Wind Farm will be connected by a maximum of five 22kV underground circuits to a 22kV/132kV substation installed within the Mumbida property. The Point of Common Coupling for access and metering purposes will be a circuit breaker connected to the substation 132kV bus.

Internal to each wind turbine will be a step-up transformer, which will convert the wind turbine output to 22kV for reticulation back to the substation.

A communication system is required within the facility and an underground fibre optic communications system will be installed to achieve this. This will allow all wind turbines to be remotely monitored and controlled at the wind farm control buildings. In addition, external Telstra communication will be installed (likely to also be underground copper or fibre optic) to the facility to allow external monitoring and control by Verve Energy and Western Power's System Operations Control Centre.

Substation

The substation will be situated central to the wind farm to minimise excessive underground cable runs from the wind turbines. The substation comprises of a range of 132kV outdoor switchgear (surge arresters, disconnectors with earth switch, circuit breakers, current and voltage transformers) and up to two main power transformers. Each transformer will form the incoming circuit into the 22kV indoor switchboard. The switchboard will have five separate feeder circuits to connect to the five strings of turbines. Both the 132kV and 22kV switchgear will be protected by various protection and control relays which will operate circuit breakers to isolate faults, should they occur.

Like other wind farm facilities within Western Australia, the Mumbida Wind Farm will likely require a voltage control scheme. This will be implemented at the substation and may involve devices such as Static or Dynamic VAR compensators.

Overhead transmission line

An existing 132kV overhead power line already exists running along the North West boundary of the property. In order to connect to the new wind farm substation, a new section of 132kV overhead power line approximately 6.5km in length will need to be constructed.

Roads and Hardstands

To build wind turbines, it is necessary to create a road network between each machine for crane access, construction equipment and heavy transportation. Refer to the Site Plan drawings in Appendix 3. There are approximately 30km of new access roads within the site, and these are marked in red on the plan.

It is also necessary to create a 'hardstand' area immediately next to each turbine for construction purposes, particularly the positioning of the crane required for turbine erection. The road and hardstand area are maintained for the life of the wind farm while areas around these that are disturbed by its construction are rehabilitated. Operational experience since our Albany wind farm was constructed has been that hardstand areas are a necessary requirement of wind farm maintenance for large cranes to stand, so typically the wind turbine suppliers requested that these remain available. This has been Verve energy's practice at every wind farm built in WA since 2002.

The principle technical consideration for both construction roads and hardstand is crane access and operation. The exact crane type is yet to be determined, however, the below picture (refer to Figure 7) will provide an indication of approximate crane size required to lift rotor blades. Slight alterations may also be required for individual hardstands depending on the topography of each wind turbine site.

Figure 7 - Suzlon S88 turbine rotor blade lift

Civil design guidelines for the installation of a typical turbine are outlined below:
General access roads are to be constructed at a minimum width of 5m.

- Cut and fill is to be kept to a minimum. A 2.5% cross fall should be provided for adequate drainage. Formal drainage maybe required in sections to avoid saturation of the subgrade.
- The construction methodology and design should minimise disturbed areas and impact on the existing environment and topography.
- Pavement depths are to be nominated by the subcontractor but should be no less than the following:
    - Crane hardstands 200mm
    - Access Roads 150mm
    - Layout areas 100mm
    - Maximum grade of access roads 10%
    - Minimum radius on horizontal curves 35m.
- The road design needs to consider where possible, corners being undertaken on a horizontal plane, with inclines being designed into the straight portions of the road design.
- The crane hardstand is to be formed such that it is vertically within 1m of the underside of the bottom flange of the base section of the tower.
- Spur Roads to access specific turbine locations may require turning allowances (turning circle or similar) to accommodate safe egress of major turbine delivery vehicles.

A detailed road design will be completed prior to construction. Final road layout will be determined in consultation with the landowner.

Roads within the Mumbida wind farm will be used by maintenance personnel for the wind farm on a regular basis.

Site Buildings

Upon commencement of construction, a compound for temporary site facilities will need to be erected to cater for site personnel and site works. Suitable temporary facilities such as a lunch room, ablutions, site office, workshop, storage, vehicle and machinery parking, laydown area and concrete batching plant will be required for the duration of the construction phase. The location of the compound will be adjacent to the proposed substation, as the area is easily accessible and central to the wind farm site. The compound will also be securely fenced to minimise property damage and to restrict public access.

Fuel or oil may be stored on site during construction and operation for cranes and earthmoving equipment. Storage will be in accordance with the Department of Water's Water Quality Protection Note 58: Tanks for Temporary Elevated Fuel and Chemical Storage 2006 and with the environmental management measures listed in Section 8.9.

Permanent facilities will also need to be erected. This will most likely be done during the construction of the substation foundations. Permanent facilities will most likely include an operations and maintenance building containing a control room, site office, ablutions, lunch room, and storage of tools and spares. A permanent employee car park will also be required.

Note: No onsite accommodation is planned or has been allowed for. Construction, operation and maintenance personnel will require accommodation off site.

Operation and Maintenance

The wind farm will be operated by Western Power from the System Operations Control Centre in Perth, in accordance with Verve Energy's dispatch instructions. All the generation sources on the SWIS are controlled in this way and this is typical of large interconnected electricity systems. The wind farm will make no difference to the present day to day electricity supply and consumers in the Geraldton-Greenough area will not notice any changes in this respect.

Some permanent staff will be based on site for the maintenance of the wind farm, and will be available on call 24 hours a day. Typically, a wind turbines service is required every three months, which involves stopping a turbine for up to 1 day. Aside from that, the turbines will operate continuously, only stopping during periods of very low or very high winds.

Decommissioning

The expected project life of the Mumbida wind farm is 20 years although through its later years upgrades may allow this to continue to operate for a further 5 years or more. Should the wind farm cease operation, it will be decommissioned and the site will be rehabilitated to the appropriate state at the time of decommissioning.

All above ground buildings, structures and equipment will be dismantled and removed off site. However, all underground foundations and cables will be left in-situ. The land owner will be consulted as to which internal access tracks they wish to keep; otherwise all other tracks will be rehabilitated.

Appendix 3 Drawings

DSEG- 119-5-000-002 Rev B Mumbida Wind Farm Site Location Map

DSEG-119-5-000-001 Rev L Mumbida Wind Farm Site Plan (based on Suzlon)

DESG-119-5-000-100 Rev D Mumbida Wind Farm GE Site Plan

DESG-119-5-000-009 Rev B Mumbida Wind Farm Existing Site Plan

Appendix 4 Stakeholder Updates

Appendix 5 Flora and Fauna Surveys

Appendix 6 Environmental Noise Assessment

Appendix 7 Visual Assessment

Appendix 8 Verve Energy's Safety and Health Policy

Appendix 9 Verve Energy's Environment Policy

Appendix D. Solar Array Specification

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POLY CRYSTALLINE MODULE

Positive power tolerance of 0~+3%

ISO9001:2008、ISO14001:2004、OHSAS18001 certified factory.
IEC61215、IEC61730 certified products.

(5BB)

KEY FEATURES

System Voltage:
The maximum voltage is promoted to 1500V and the module strings are extended by 50% which reduces the overall system BOS.

5 Busbar Solar Cell:
5 busbar solar cell adopts new technology to improve the efficiency of modules , offers a better aesthetic appearance, making it perfect for rooftop installation.

High Power Output:
Polycrystalline 72-cell module achieves a power output up to 340Wp.

PID RESISTANT:
Eagle modules pass PID test, limited power degradation by PID test is guaranteed for mass production.

Low-light Performance:
Advanced glass and surface texturing allow for excellent performance in low-light environments.

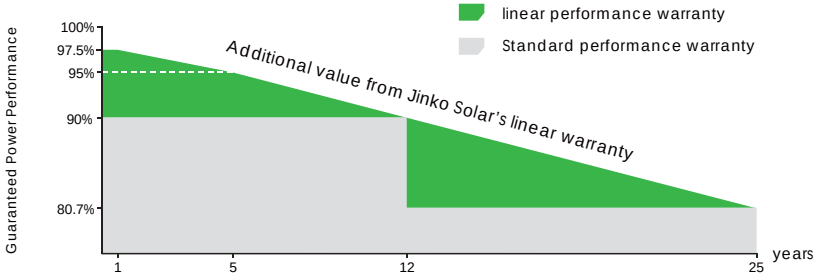
Severe Weather Resilience:
Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).

Durability against extreme environmental conditions:
High salt mist and ammonia resistance certified by TUV NORD.

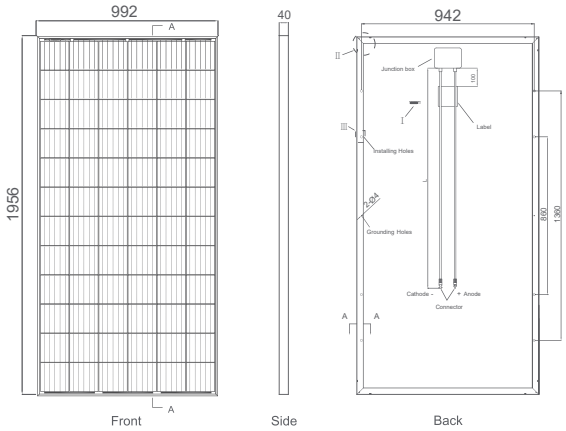
Temperature Coefficient:
Improved temperature coefficient decreases power loss during high temperatures.

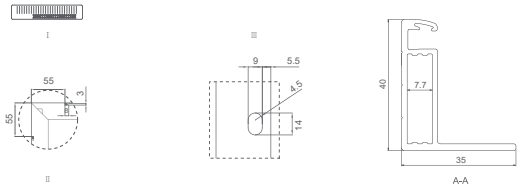
LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty

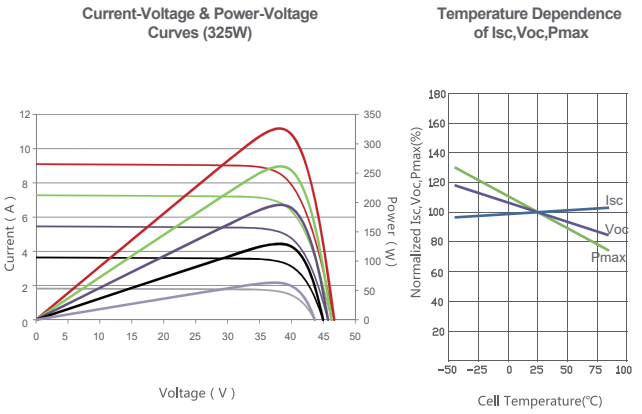


Engineering Drawings





Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	Poly-crystalline 156×156mm (6 inch)
No.of cells	72 (6×12)
Dimensions	1956×992×40mm (77.01×39.05×1.57 inch)
Weight	26.5 kg (58.4 lbs.)
Front Glass	4.0mm, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TÜV 1×4.0mm², Length: 1200mm or Customized Length

Packaging Configuration

(Two pallets=One stack)

26pcs/pallet, 52pcs/stack, 624 pcs/40'HQ Container

SPECIFICATIONS

Module Type	JKM320PP-72-V		JKM325PP-72-V		JKM330PP-72-V		JKM335PP-72-V		JKM340PP-72-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	320Wp	237Wp	325Wp	241Wp	330Wp	245Wp	335Wp	249Wp	340Wp	253Wp
Maximum Power Voltage (Vmp)	37.4V	34.7V	37.6V	35.0V	37.8V	35.3V	38.0V	35.6V	38.2V	35.9V
Maximum Power Current (Imp)	8.56A	6.83A	8.66A	6.89A	8.74A	6.94A	8.82A	6.99A	8.91A	7.05A
Open-circuit Voltage (Voc)	46.4V	43.0V	46.7V	43.3V	46.9V	43.6V	47.2V	43.8V	47.5V	44.0V
Short-circuit Current (Isc)	9.05A	7.35A	9.10A	7.40A	9.14A	7.45A	9.18A	7.52A	9.22A	7.98A
Module Efficiency STC (%)	16.49%		16.75%		17.01%		17.26%		17.52%	
Operating Temperature(℃)	-40℃~+85℃									
Maximum system voltage	1500VDC (IEC)									
Maximum series fuse rating	20A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.40%/℃									
Temperature coefficients of Voc	-0.31%/℃									
Temperature coefficients of Isc	0.06%/℃									
Nominal operating cell temperature (NOCT)	45±2℃									

STC: Irradiance 1000W/m² Cell Temperature 25°C AM=1.5

NOCT: Irradiance 800W/m² Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s

* Power measurement tolerance: ± 3%